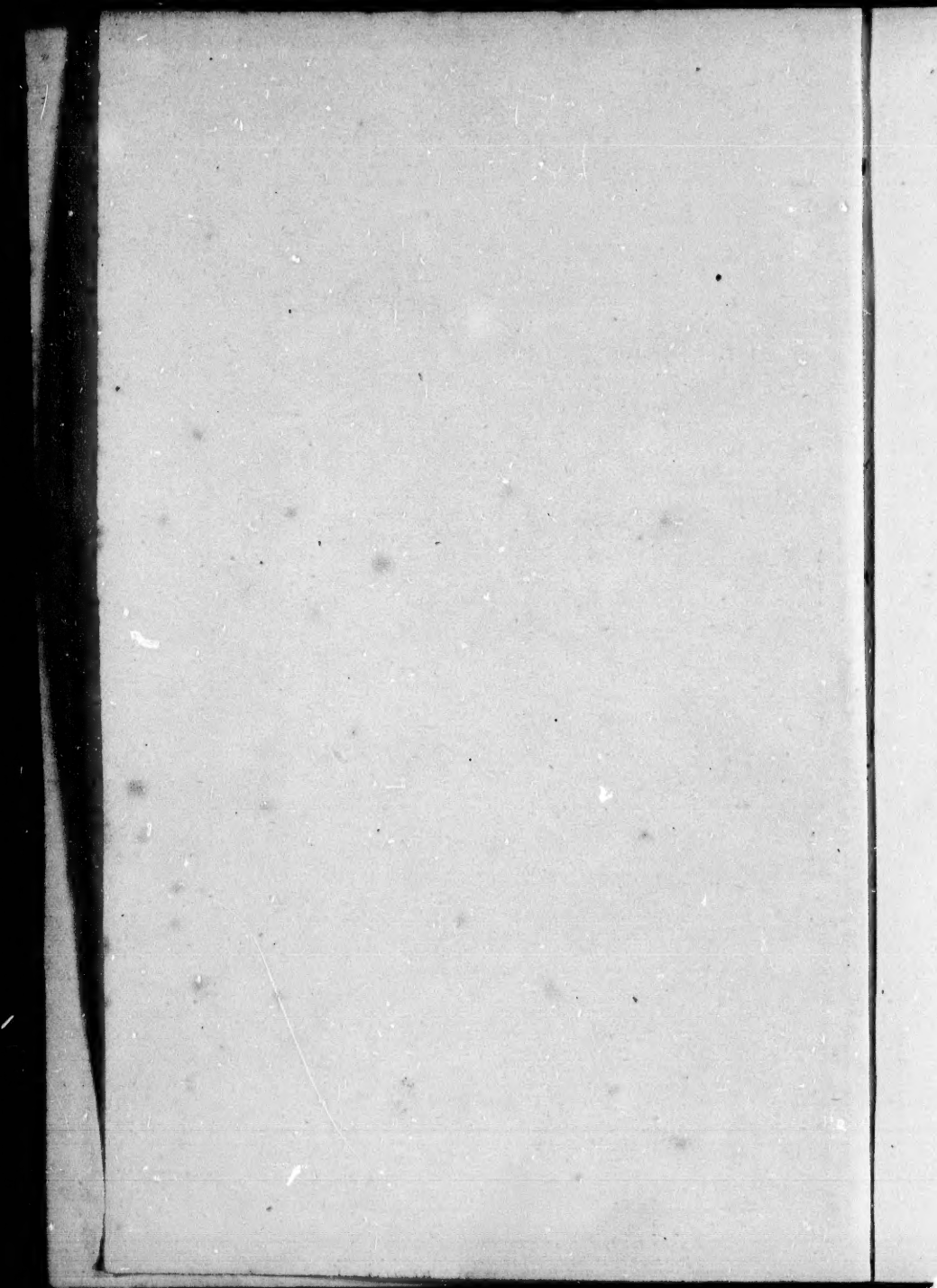




SAILING DIRECTIONS
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OF
NORTH AMERICA.

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WEST COAST
OF
NORTH AMERICA

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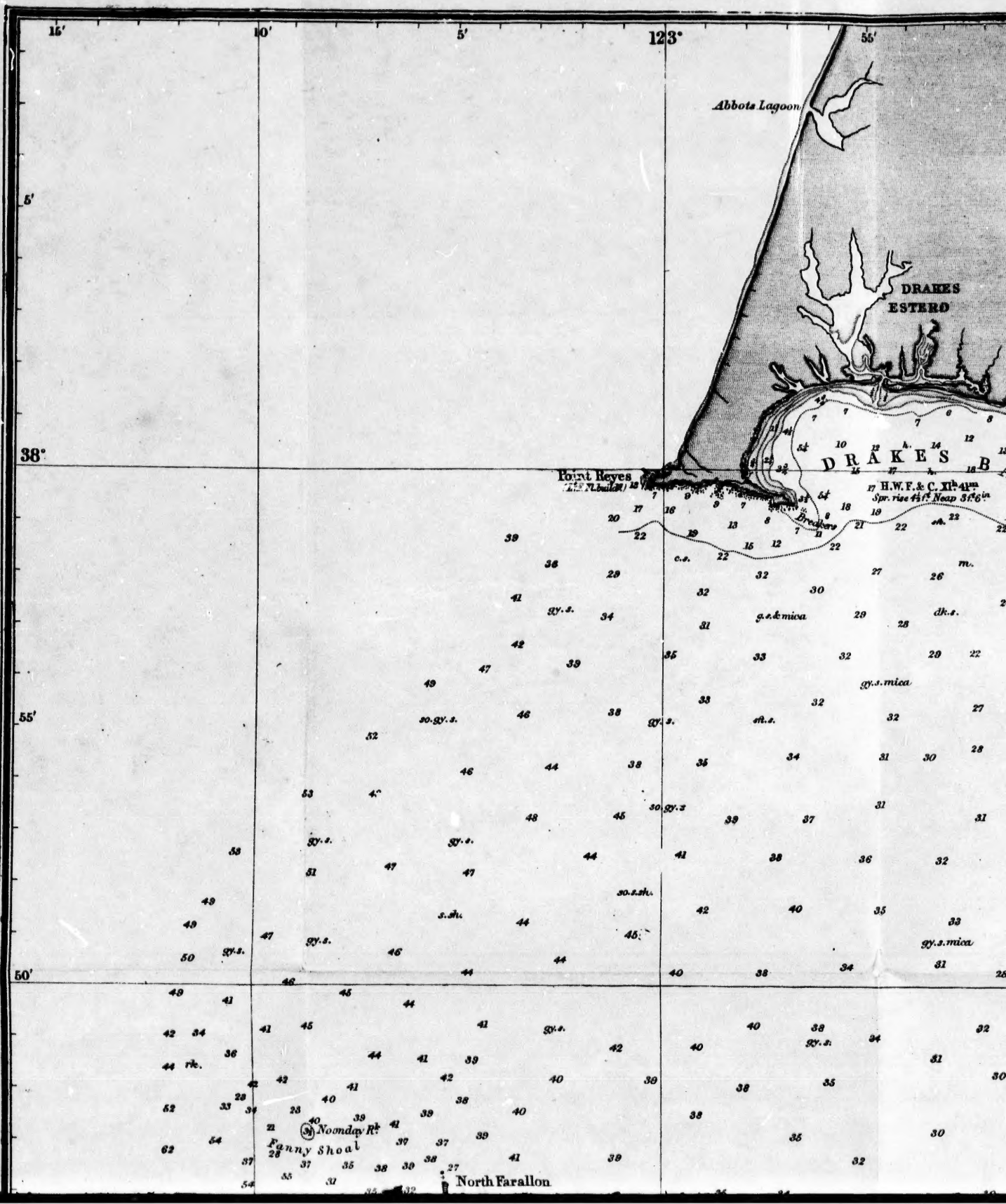
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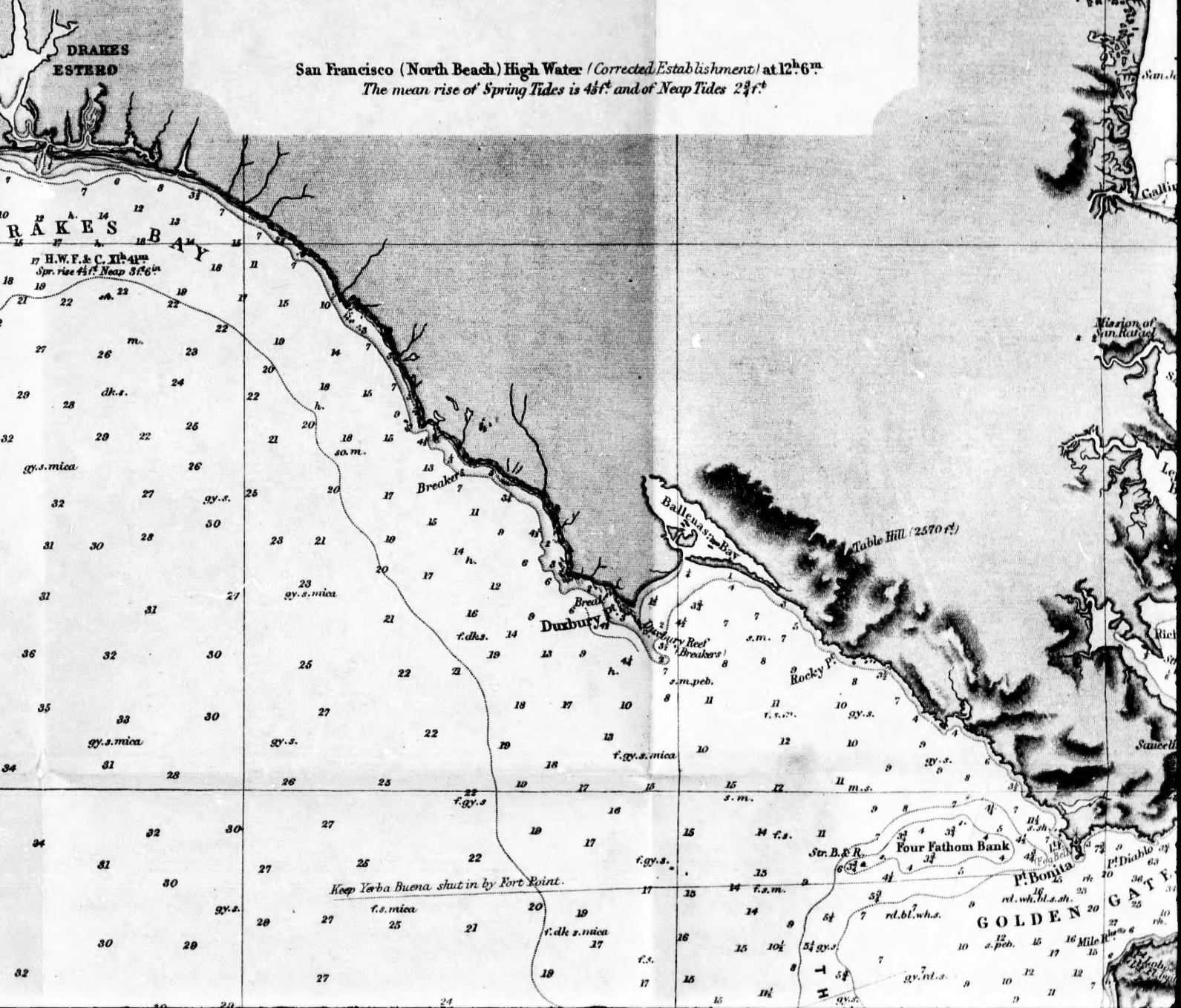
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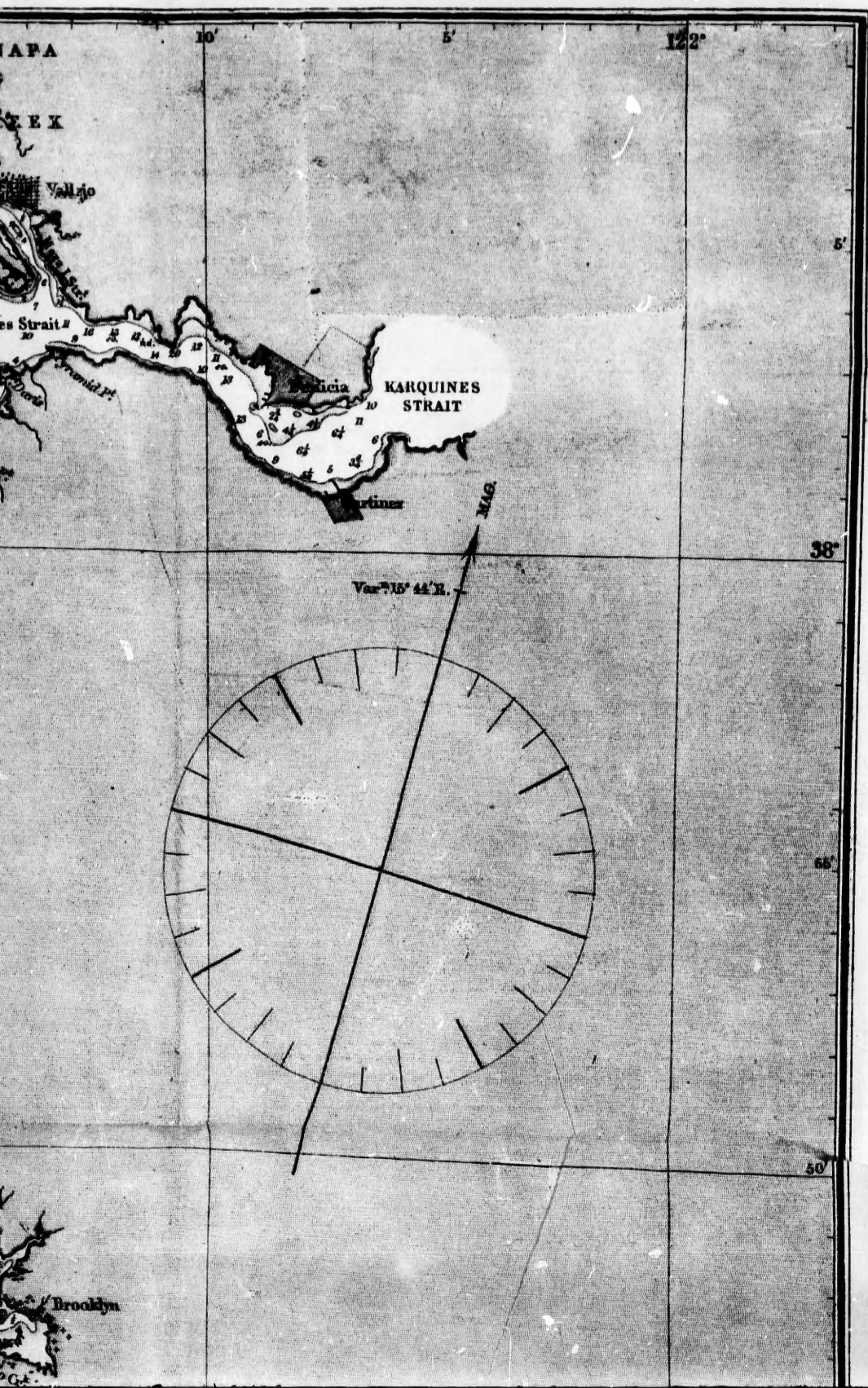


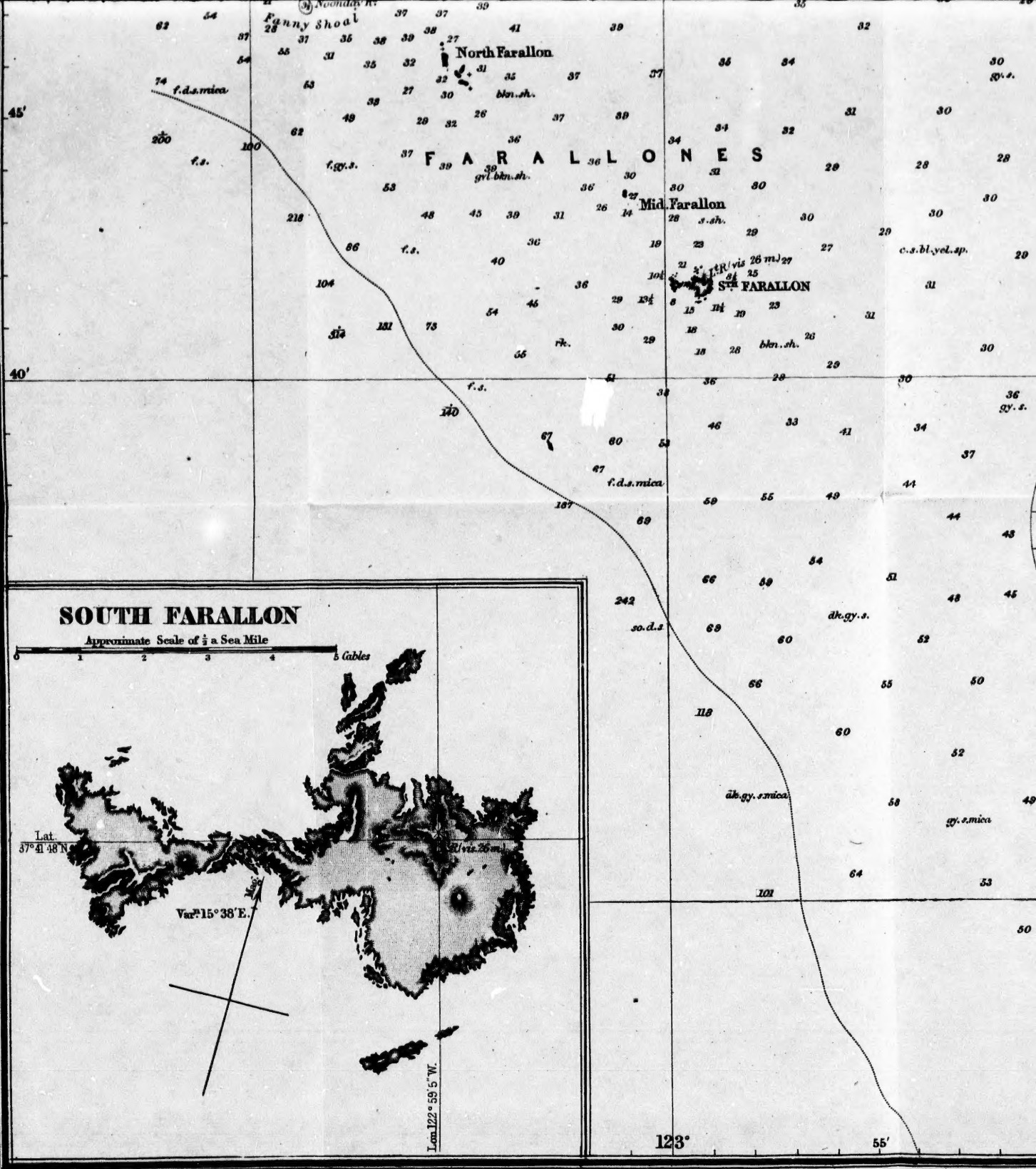
SAN FRANCISCO BAY

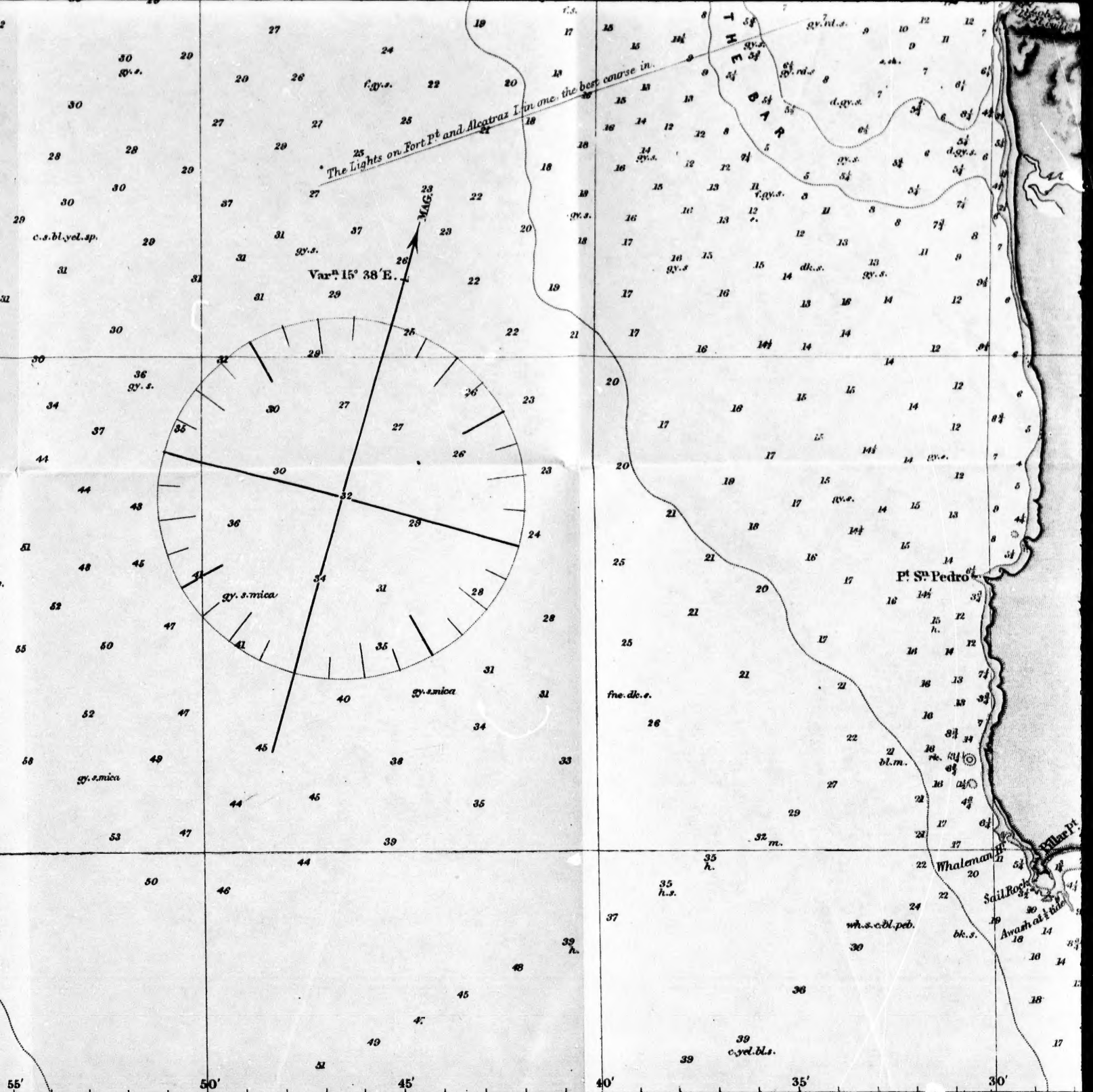
San Francisco (North Beach) High Water (*Corrected Establishment*) at 12^h 6^m.
The mean rise of Spring Tides is 45^{ft} and of Neap Tides 24^{ft}.

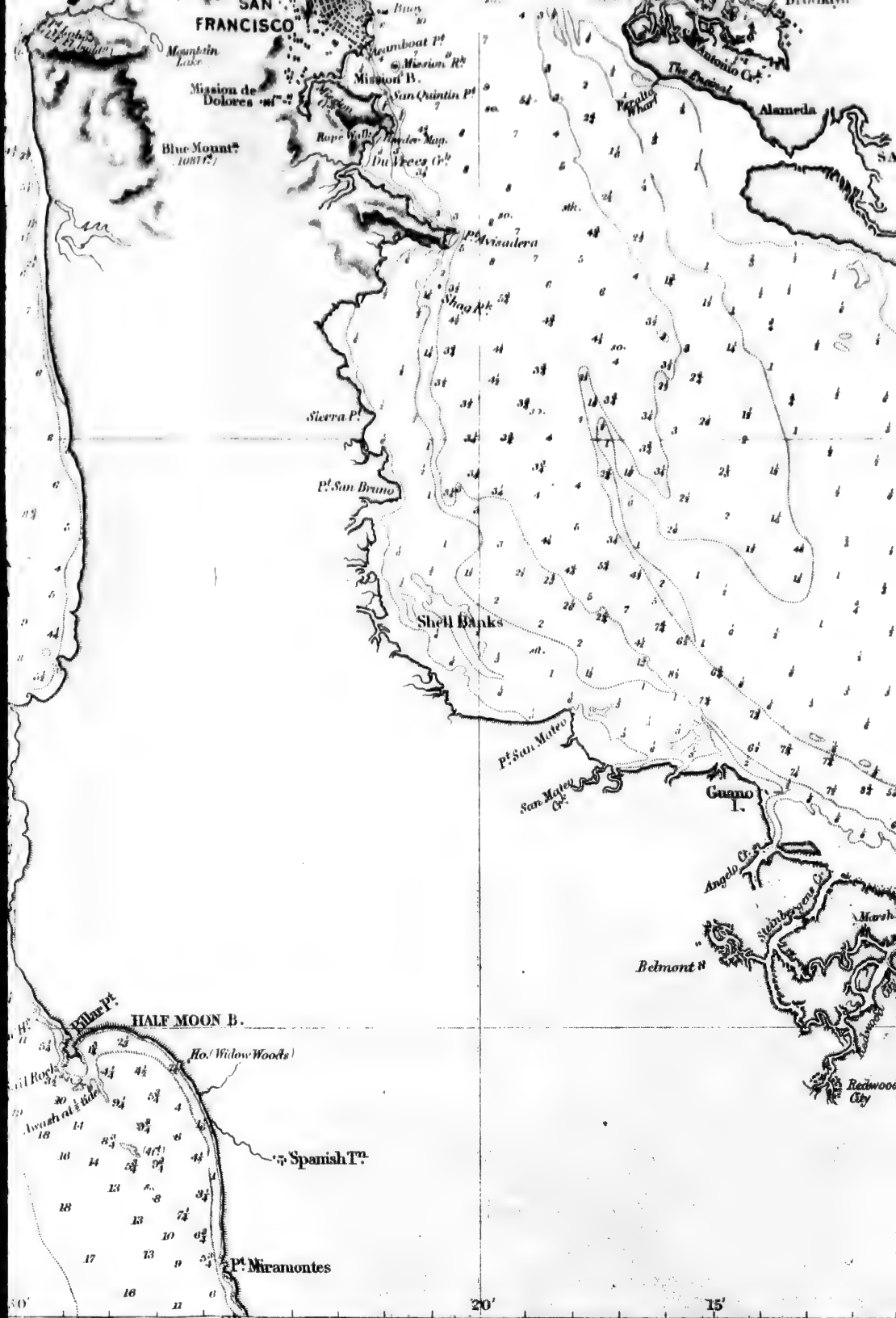












SAN FRANCISCO

Mountain Lake

Mission de Dolores

Blue Mount 1087 ft.

Mission B.
Mission R.
San Quintin Pt.

Rope Walks
Rope Walks
Du Treey Gr.

P. Avila

Sierra P.

P. San Bruno

Shell Banks

P. San Mateo

San Mateo Cr.

Guano I.

Angelo Cr.

Belmont R.

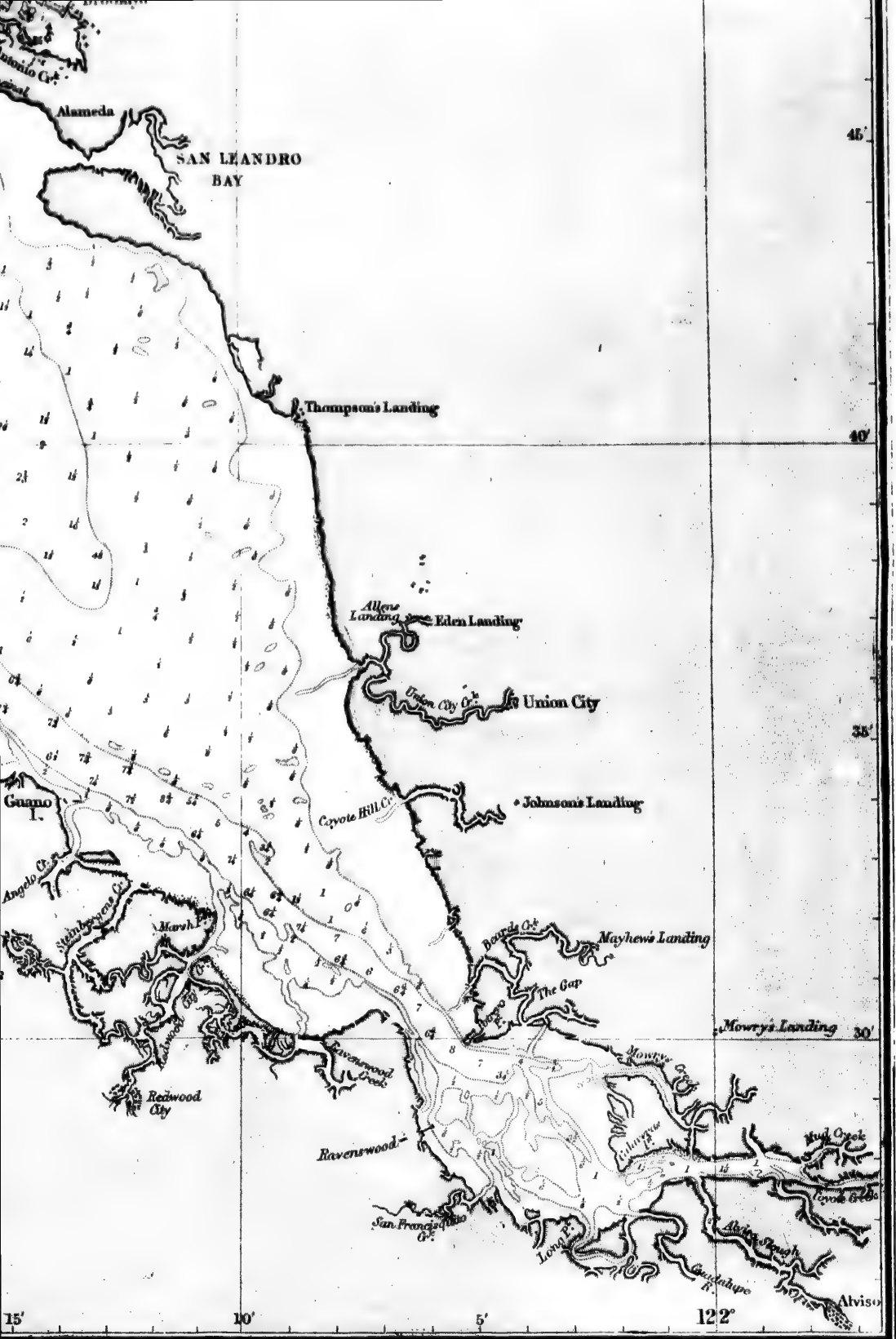
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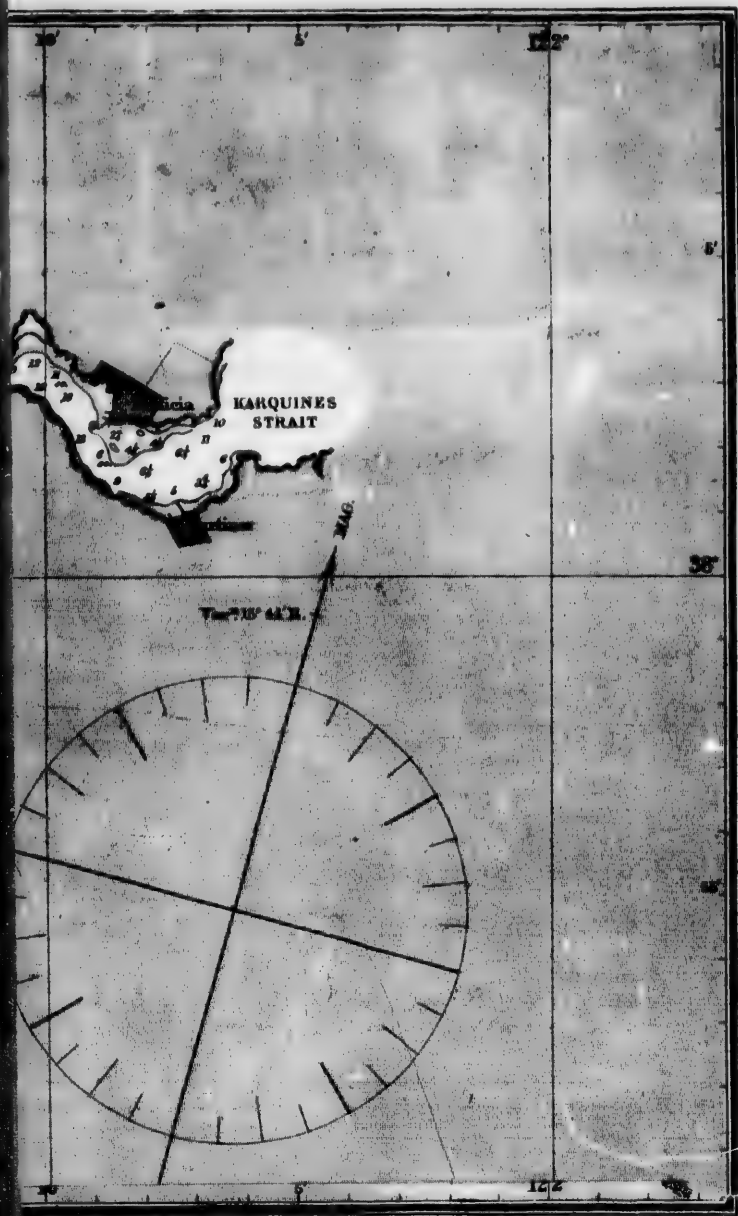
Ho. Willow Woods

Spanish Tn.

P. Miramonte

Redwood City





SAILING DIRECTIONS
FOR THE
WEST COAST
OF
NORTH AMERICA,
BETWEEN
PANAMA AND QUEEN CHARLOTTE ISLANDS.

By JAMES F. IMRAY, F.R.G.S.



SECOND EDITION.

LONDON:
JAMES IMRAY & SON,
MINORIES AND TOWER HILL,
1868.

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PREFACE.

Since the publication of the first edition of this work great and important changes—both political and commercial—have occurred on the western seaboard of the North American Continent; not only have vast territories passed into other hands and new boundaries been determined for various states, but the discovery of extensive “gold bearing” districts, which at first drew thither a large body of immigrants bound for the “diggings,” and who went there merely to search for the precious metals and for minerals, has finally resulted in the settlement of richly productive agricultural tracts; thus villages have become towns,—and towns, cities,—while the formerly unfrequented harbours and roadsteads have become marts of commerce to which the shipping of all nations resort,—and so, as regards navigation, calls for better and improved charts, and sailing directions.

The lack of information which rendered the first edition very incomplete can now no longer be pleaded. In the interval the different maritime nations have been emulous in the production of good surveys, and hence what formerly could only be presented to the Navigator in detached fragments, becomes a connected description of the entire coast from Panama to Queen Charlotte islands,—not so perfect as a continually increasing commerce may ultimately demand, but still sufficient for its present exigencies. The deficiencies will be supplied as opportunity offers, as new ports are opened, and as the increasing traffic of the older ports improves,—as changes resulting alike from physical and human causes occur.

J. F. I.

Nov. 1867.

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Dampier's Voyages. 4 vols.

Voyages and Travels by Captain Basil Hall, R.N.

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Narrative of a voyage to the Pacific performed in H.M.S. *Blossom*, under the command of Captain F. W. Beechey, R.N., F.R.S., in the years 1825-28.

Voyage of discovery to the North Pacific Ocean and round the world, performed in the years 1790-95 by Captain George Vancouver, R.N.

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The charts of the coast of North America published by Messrs. Imray & Son, of which this work may be considered the accompanying Memoir are the following :—

COAST of NORTH AMERICA, from COIBA ISLAND to SAN BLAS ; one large sheet With plans, on a large scale, of the harbours of Sihuatanejo, Acapulco, Guatulco, San Carlos, Realejo, Salinas, Culebra, Punta Arenas, Arenitas, San Blas, and illustrated with some views of the coast. Drawn from the Spanish surveys, and the surveys of Captain Beechey and Commander Belcher, of the Royal Navy. .. 5s. 6d.

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SAILING DIRECTIONS

FOR THE

WEST COAST

OF

NORTH AMERICA.

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** * * The Bearings and Courses are Magnetic. The Depths are those at low water spring tides. The Distances are in Nautical miles of 60 to a Degree of Latitude.*

N.B.—As the Latitudes in this work are North of the Equator, and the Longitudes are West of Greenwich, the distinctive letters N. and W. are omitted.

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COASTS OF CENTRAL AMERICA AND MEXICO.

Central America includes all the territory lying between Mexico on the north, and the isthmus of Panama, on the south. In length 700 miles, and of very variable breadth, it nevertheless contains 192,000 English square miles, or more than twice the extent of Great Britain. Situated in the torrid zone, between latitude 8° and 18°, longitude 81½° to 98°, it at once separates the Atlantic from the Pacific ocean, and unites the continents of North and South America; a position as important commercially, as it is geographically remarkable and unique.

It includes the independent states of Guatemala, San Salvador, Honduras, Nicaragua,* and Costa Rica, with the British colony of Belize, or British Honduras. It is bounded on the north by Mexico; on the south-west by the Pacific; and on the east by the Caribbean sea, and the bay of Honduras.

The five states of Central America nearly correspond, at the present time, with the "Intendencias," as they existed under Spanish Colonial rule. Their boundaries are pretty clearly defined, and vary but little. They are subdivided into departments, and districts; the latter applying to the less peopled, though often extensive tracts, covered with almost impenetrable forests.

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* The Mosquito territory, formerly under British protection, is now included in the state of Nicaragua.

The state of Guatemala includes a considerable and populous highland district to the south and west, while to the northward, vast territories, such as those of Vera Paz and El Peten, are but thinly inhabited. It has the largest population (nearly one million), and far surpasses the other states in import ance. Its growing trade is considerable, and principally carried on with the English. Istapa and St. Thomas are the principal seaports. The exports are numerous, consisting chiefly of cotton, wheat, cocoa, sugar, coffee, dyewoods, metals, and cochineal. In 1860 the imports amounted to \$1,484,700, and the exports to \$1,918,800.

In lat. 14° 41', long. 90° 36', is Guatemala la Nueva, a *new* city, the inhabitants having abandoned the old city on account of earthquakes. This is the present capital, and though a comparatively mean looking place of one storied houses, it may on many accounts be considered as the principal town in Central America. It is situated on the border of one of the elevated plateaux of the main Cordillera, known as *Los Llanos de las Vacas*, or the valley of *Harmita*. This plain is surrounded by bold ranges of mountains, among which stand prominent the two lofty volcanoes of *Agua* and *Fuego*, and a third called *El Volcan de Pacaya*, which is scarcely, if at all, inferior to them. The plain is about 5000 feet above the level of the sea, and is 15 miles wide and 18 broad. The climate though considered inferior to that of Antigua or old Guatemala, is mild and salubrious. The thermometer rarely rises above 70°, and still more rarely descends below 64°. The number of inhabitants, who are chiefly Ladinos, the mixed or Mestizo race, and pure Creole Spaniards, the unmixed descendants of Spanish colonists, is estimated at 60,000; and in importance and wealth, it is second, in Spanish America, only to the city of Mexico.

The state of San Salvador is situated on the western coast. Its climate is hot, but more healthy than that on the eastern shores—perhaps because the land is better cleared and cultivated. The chief products of this state are indigo, and tobacco. The city of San Salvador, its capital, only a few miles distant from the Pacific ocean, was nearly destroyed by an earthquake in 1854, prior to which it contained 20,000 inhabitants; but it is now reviving: during a short period it was the seat of the Federal Union, and, like Washington, it had at that time a certain territory around the city, distinguished as the Federal District. Cojutepeque is an important town with 15,000 inhabitants, and Sonsonate with 10,000 inhabitants is famous for its distilleries. The principal seaports are Acajutla, Libertad and La Union. In 1860 the imports amounted to \$1,819, 800, and the exports to \$2,840,800.

The state of Honduras takes its name from the bay of Honduras, (signifying *depths*), which forms its northern boundary. The first navigators so denominated it, because they with difficulty obtained soundings in it. The surface of the ground is, in this state, even more generally uneven than elsewhere. Its population is scanty in comparison with the two former states; and, like Guatemala, it still comprises vast districts of virgin forests, partially peopled by Indians. The climate, like that of the other states, is varied, being generally temperate in the interior, which is notable for its mines,—and hot near the coasts, which abound with rivers, from the banks of which much mahogany and sarsaparilla are obtained. Comayagua (formerly Valladolid) the capital, is a city of some importance, with 18,000 inhabitants. This state possesses two sea-ports, Truxillo and Omoa, which were active as military and commercial depôts of Spain, but are now fallen into comparative decay. Tegucigalpa has gold, silver and copper mines in its vicinity.

The state of Nicaragua is exceedingly fertile, and generally salubrious; but, notwithstanding its possessing several advantages over Honduras, it is but little more populous. This may partly be accounted for by the absence of any leading branch of industry, or any considerable activity in its commerce, but still more by its frequent civil wars. In a land surpassingly volcanic, this state is pre-eminently so. The very roads, in some parts, sound hollow under the hoofs of the mules or horses. Leon, the capital, and Granada are large cities, and once enjoyed great wealth and commercial prosperity; but, like all chief towns in Central America, they have suffered much from crime and consequent internal disorganization, as well as from civil wars, political commotions, and misrule. These cities, from the highest rank in repute and influence, are now reduced to little better than heaps of ruins, scantily inhabited, and, where best, affording abundant evidence of both earlier and more recent devastations. Leon, between lake Managua and the Pacific, is said to have contained at one time 82,000 people; it is now reduced to less than half that number. Granada one of the oldest cities in Central America has about 10,000 inhabitants; it is beautifully situated on the N.W. shore of the lake Nicaragua. The town of Nicaragua, about 36 miles south-east of Granada, though inferior in size and importance, gives its name to the state and the lake. Like Granada, it is advantageously situated on its banks, opposite the populous island of Ometepe, which is in the lake, and contains an active volcano. Great interest at present attaches to this state and its waters, in connection with the long formed and often talked-of project of connecting the two oceans at this point, which is now about to be put to the test of experiment, if not actually to be realized.

The Central America state which at present enjoys the greatest degree of tranquility and political prosperity, is Costa Rica. Its isolated position on the narrower part of the isthmus of Panama, making communication with the other states difficult, has preserved it in a great measure from participating in the wars that have desolated the rest of the country; a circumstance which, conjointly with a great accession of commercial vigour, arising out of the successful cultivation of coffee, has given it of late an impulse unknown to the sister states. While other large cities have been decaying, San José, its new capital, has risen into importance within a very few years, and already numbers upwards of 80,000 inhabitants. Cartago, the former capital, and two other towns of some magnitude (Heredia and Alajuela) occupy, with the modern capital, an extensive table-land stretching almost across the isthmus. These towns, together with two or three small ports on each ocean, include almost the entire population (126,750) of this compact and thriving state. In 1860 the imports amounted to \$911,000, and the exports to \$1,878,900.

The principal lake in Central America is that of Nicaragua, whose surplus waters descend to the Atlantic by the river San Juan del Norte. It is an inland sea, larger than the island of Jamaica, being 90 miles long N.W. to S.E., and about 40 miles broad; with an area of about 8500 square miles. In many places the water is 10 to 15 fathoms deep, and it is stated that there are but few shallows. It contains a small archipelago of islands, and on one fertile and populous island, named Ometepe, there is a volcano. This lake is also connected with that called Managua, itself no inconsiderable body of water. The shores of these magnificent waters, which are likely to afford important facilities for commerce, are of surpassing fertility,

and as salubrious as they are beautiful. It is from the lake of Nicaragua that the canal is proposed to be cut, connecting the lake with the port of San Juan del Sur, on the Pacific.

Not far from the western or Pacific coast, the country is traversed from north-west to south-east by a continuous cordillera or unbroken chain of mountains, unbroken at least as far as the lake of Nicaragua, which are covered with diversified vegetation. This forms a kind of connecting chain between the rocky mountains of the north, and the Andes of the South American continent. Some of the loftiest summits are 12,000 feet high. Frequent spurs or offsets from the "Sierra Madre," the main ridge, intersect the plains at right angles, and sometimes extend to the sea shore.

At various degrees of elevation along the sides and on the summits of the mountains, are numerous plateaux or table-lands, like so many natural terraces, some of them of great extent, and all delightfully temperate and luxuriantly fertile. These regions especially seem to invite the residence of man, and to invite the culture of his hand. They constitute a distinguishing feature of this and some neighbouring countries. But none of those countries, and probably no part of the earth, presents a greater diversity of level on a surface of equal extent than does Central America; consequently, no country possesses such variety of climate, or offers such facilities of adaptation to all kinds of productions and to all constitutions of men, from the sun-burnt inhabitants of a tropical plain, to the hardy mountaineer inured to perpetual snows.

Most of the highest peaks and isolated mountains are volcanoes. The rocks are of granite, gneiss, and basalt; but volcanic formations and ejections predominate. Not less than thirty volcanic vents are said to be still in activity. The traces of remote, as well as recent earthquakes are clearly discernible in the fissures and ravines that everywhere abound. Extinct craters, rent rocks, beds of lava, scorise, vitrified, charred, and pumice stones, together with hot and sulphureous springs, all mark it as the most volcanic region known. Indeed, shocks of earthquakes, generally slight, are periodically felt at the opening and closing of the wet season.

The productions of Central America are numerous. Abundant materials for exchange with other nations are afforded in cotton, coffee, sugar-cane, arrow-root, ginger, tobacco, and even silk-worms, though but lately imported; but especially in "anil" (indigo), and "grana" (cochineal), which, because most lucrative, absorb almost all the attention of the planter. Other marketable productions are not wanting; but both known and unknown sources of wealth decay in the forests, or lie hidden beneath the soil. Besides these, the more temperate regions yield all, or nearly all, the productions which are raised in Europe. Wheat and barley are cultivated sometimes by the side of the sugar-cane, on the elevated plains; and the markets of the larger towns are supplied at once with the productions of torrid and of temperate climes; so that, at all seasons, the green pea, the cauliflower, and cos-lettuce, are sold along with the avocado-pear, sweet potato, olive, capsicum, or chilies, and many other productions of opposite climates, less delicate, perhaps, but more common and useful. Of edible fruits, those most common are the banana, pine-apple, orange, sweet lemon, lime, shaddock, forbidden fruit, water-melon, musk-melon, sapote, mango, guava, fig, tamarind, pomegranate, granadilla (fruit of the passion flower), sea-grape, papia, mamme, star and custard-apples, cocoa, cashew, and ground nuts. There are said to be in all "more than forty genera," including, probably, those introduced from Europe, such as the apple,

pear, quince, cherry, &c., which, though they are found to thrive, are little appreciated, and none of any sort can be said to be cultivated with care. The same remark applies, though with frequent exceptions, to garden flowers, which are still more varied.

It has been well observed by Mr. Frederick Crowe, that "the precious metals of Central America, together with quicksilver, copper, lead, iron, talc, litharge, and most other minerals that are in use, only await the labour and ingenuity of man to extract them from the bowels of the earth, and convert them into objects of convenience and beauty; and seams of coal, ochre, gypsum, sal-ammoniac, and wells of naphtha, are also ready to yield their valuable stores. Jasper, opal, and other precious stones are also found; and pearl fisheries have long existed upon the coasts. In fine, there is no lack of any thing that nature can bestow to sustain, to satisfy, and to delight. So abundant are the necessaries of life that none need want; so profuse are the bounties of nature that they are suffered to decay through neglect. The peach-tree and the rose run wild on the borders of the orange grove, whose fruits and flowers are alike simultaneous and perennial; and the pine-apple, the mango, and the water melon are preferred to the almond, the olive, and the grape. Such is the nature of the soil, that the exuberance of that wealth which rots upon its surface in the less populous parts of Central America, would amply clothe and satisfy with bread thousands of the sons of want who fill our streets and unions, dispelling that aqualid wretchedness which penury and destitution have produced, and mitigating some of the woes which embitter the lot of so many of our fellow-countrymen. It may be that the time is not far distant when many such will seek these fruitful shores, and under wise direction, not only benefit themselves, but, while redeeming fertile valleys and plains from desolation, greatly bless the timid natives with higher arts of life.

Lying between the parallels of 10° to 18° , and almost insular as to any influence of the continent on its temperature, the climate of the coasts and lowlands is hot and humid. That of the interior varies with the altitude, and is generally mild, equable, and salubrious. The two seasons, aptly designated the 'wet' and the 'dry,' are well defined. They may be said equally to divide the year, though they vary considerably in different districts. The rains, everywhere copious, are more continual in some parts, and the drought is more severe in others, but the dry season is nowhere uninterrupted by refreshing showers, and the wet is everywhere relieved by an interval of dry weather.

In the highlands of the interior, the seasons are singularly regular. The dry weather commences about the close of October, and terminates on the 12th or 18th of May, rarely varying even a few hours. It is most frequently on the 12th that 'the windows of heaven are opened.' The sky is then suddenly obscured with thick clouds, which burst simultaneously, often accompanied with thunder, and sometimes with hail. This is confined to the afternoon, and returns on the following days, or perhaps for successive weeks, at the same hour, or a little later. During the whole of the wet season, which is by far the most agreeable, the forenoon is almost invariably cloudless, and the atmosphere clear, elastic, and balmy. The rains are often confined to the evening and night, or to the night hours only. During the dry season, the mornings and evenings are often so cool and bracing as to predispose to active exercise, though fires are never resorted to. Through the day the sky is seldom obscured, and light clouds only are to be seen sweeping rapidly along the plains during the short twilight that ushers in the equinoctial day, thence

they rise and hang in clusters round the tops of the mountains till the sun has gathered strength to dispel them; in the evening they return to attend its setting, and add inimitable beauty to the gorgeous scene. At all seasons the entire disc of the moon is distinctly visible through all its phases, but now it shines with such uninterrupted clearness, as entirely to supersede, when above the horizon, the necessity of artificially lighting the streets; and even in the absence of the ruler of the night, the brilliancy of the stars dispels all gloom. In some districts on the eastern coasts, through local influences, it rains more or less all the year; which, however, adapts them for the growth of certain vegetable productions; while the districts where the dry weather lasts the longest are alone suitable for the cultivation of others. On the more elevated plains, such as those of Quesaltenango, in the department of Los Altos, the heat is never so great as during the summer months in England; and though snow is said sometimes to fall in December and January, it immediately dissolves, and the thermometer never descends so low as the freezing point."

GULF OF PANAMA.

The southern limits of the gulf of Panama are usually considered to be point Garachiné and cape Mala. The coast immediately south of the gulf is not properly included within the limits of the present work, but as many ship-masters using it, may make the gulf from southward, it is considered convenient to commence our description of the coast with cape Corrientes.

CAPE CORRIENTES, the south-west extremity of which is in lat. $5^{\circ} 28' 46''$, long. $77^{\circ} 32' 33''$, may be easily known by the dome-like peaks of Anana, about 1500 feet high, which rise directly over it; this is the first high land north of Monte Christo (in Lat. $1^{\circ} 8' 40''$, Long. $80^{\circ} 40''$), and generally makes like an island from southward. It is densely wooded from the summit to high water mark, and the almost constant rains giving a bright green colour to the peaks. At about 8 miles northward of the cape is Alusea point, the northern extreme of the promontory. The water off this projecting point of land is deep, 50 fathoms being found close to the rocks, and 100 at a distance of less than 8 miles. In the vicinity of the cape the current appears to set constantly northward.

On the south side of cape Corrientes is Cabita bay, situated eastward of a high rocky point, distant about 8 miles from the cape; although open to southward, there is here good anchorage, with a capital watering place. Vessels may lie in 18 fathoms at about $\frac{3}{4}$ of a mile from the stream in the bight of the bay, with the western horn bearing S.W. by W. On the eastern side of the bay the high bold land suddenly terminates, and a beach, with low river land commences, extending, with the exception of the cliffs north of the river Buenaventura (in lat. $8^{\circ} 49'$) and that of Cascajal point, as far south as the river Esmeralda, a distance of 400 miles. At about 5 miles south-eastward from the watering-place is the mouth of the river Jeya, southward of which is a remarkable perforated rock named Iglesia (or Church) de Sevilla.

The coast from Alusea point northward trends eastward 14 miles to the river Nuki, a small mountain stream; the shore between consists alternately of bluffs and sandy beaches, with a few rivulets. At about 8 miles N.N.W. from the river Nuki is a cluster of high rocks, facing, at the distance of

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2 miles, the river Chiru, another mountain stream; and 8 miles northward of these rocks is the Morro Chico, a pinnacle of a similar nature. From these rocks the coast runs in the same direction, high, rugged, and woody, nearly 8 miles to Port Utria.

UTRIA.—This harbour is about 3 miles long in a northerly direction by $\frac{1}{2}$ a mile broad, and has an average depth of 12 fathoms. It is formed on the east side by a lofty but narrow peninsula, which has two islets and some detached rocks off its south point. The entrance is south-eastward of these; it has no hidden dangers, the shores being steep. The eastern side consists of a sandy beach, which runs out to a spit $2\frac{1}{2}$ miles within the entrance; at this point the harbour is only a $\frac{1}{2}$ of a mile across, but northward of it, it widens and forms a commodious basin.

The situation of port Utria will be easily known by Playa Baia, a beach about 4 miles long, fringed with cocoa-nut trees; this is immediately northward of the peninsula, and the land behind it is low. At its north extreme is the mouth of the little river Baia, off which is a rocky islet.

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At about 12 miles northward of the river Baia, is a long, rocky, tongue-like projection named point Solano, on the eastern side of which is the deep bay of Solano. A reef, consisting of rocky patches with deep water between, extends $1\frac{1}{2}$ miles from the point, and has soundings of 16 to 80 fathoms close to it; it must therefore be carefully avoided. The coast southward of this point is high and rocky, with occasional small beaches. There is a patch of rocks 8 cables from the shore, at about 6 miles southward from the extremity of the point, and the water is deep, 40 fathoms, within 1 mile of the coast.

SOLANO BAY is a spacious anchorage formed by Solano point on the south-west, and a lofty promontory, which juts out some 8 miles on the north. At about 2 miles south-westward from the north point of the bay, there is a small chain of rocky islets, nearly 1 mile long, the centre of which has a remarkable sugar-loaf form; they are barren and frequented by large numbers of gannets. The soundings in the bay are from 60 to 15 fathoms, the latter being close to the shore.

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CUPICA BAY.—From Solano bay the land trends northward about 20 miles to Cupica bay, which is about 5 miles wide, and justly considered one of the best anchorages on this coast. It is formed on the west side by a projecting point named Cruces, having off it some detached islets, the outermost of which is distant about 2 miles. Vessels may anchor in any part of the bay in a convenient depth, and find shelter from all winds except those from southward.

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When in Cupica bay, the nearest and most convenient mode of access to the Naípe, a tributary of the Atrato, is from Limon bay, on the eastern shore; the land above it is about 500 feet high, over which is a waterfall named Quebrada del Mar. The head of Cupica bay is a sandy beach $4\frac{1}{2}$ miles long, at the west extreme of which is the mouth of river Cupica; on its banks there is a village with some plantations from which vegetables can be obtained.

It is high water, full and change, in Cupica bay at 8h. 30m., the rise being about 18 feet. The current in the offing sets northward.

OCTAVIA BAY.—From Cruces point the coast trends north-westward 15 miles to point Marzo, which is of a similar nature, and also has detached islets extending $1\frac{1}{2}$ miles southward from it. The bay eastward of Marzo point named Octavia, although smaller than that of Cupica, possesses convenient depth for anchorage. In addition to these detached islets, there are

high barren rocks of fantastic shapes lying about $1\frac{1}{2}$ miles southward of them; the passage between is deep and clear.

The coast on the western side of point Marzo is bold, rugged, and thickly wooded; it runs in a northerly direction nearly 8 miles, to some detached islets, lying 1 mile from the coast with 16 fathoms in-shore of them. Thence the coast bends sharply to the eastward for 2 miles; the cliffs ceasing at the mouth of the river Coredo, a small stream easily entered by a boat, from which a continuous line of beach, with low land behind it, extends to the north-west for $1\frac{1}{2}$ miles, as far as Ardita bay. This part of the coast are the mouths of two small streams, the Garachiné and the Ourado, both of which are barred. This whole coast, like that to the southward, is thinly inhabited, huts being generally found in the bays and in the vicinity of the numerous small rivers. Ardita bay, may be known by a small islet lying off it. From Ardita bay to Pinas point, a distance of 82 miles, the coast is high, rugged, and thickly wooded, having deep water close to the shore, with the exception of two small bays situated about 20 miles northward of Ardita; the northern one, Gusgava, has convenient anchorage;—there is also a beach directly south of Pinas point.

PINAS BAY in lat. $7^{\circ} 84'$, is about 8 miles northward of Pinas point. It affords the best anchorage between Octavia bay and Garachiné point. It is 2 miles deep by $1\frac{1}{2}$ miles wide, with an average depth of 10 fathoms, and is open to south-westward, from which quarter occasional squalls in the wet season, throw a considerable swell into it. The head of the bay consists of a beach, little more than 1 mile in length, with low land behind it; the sides of the bay are high and rocky. Good water may be obtained from a stream at the west extreme of the beach, which is protected from the swell by a small natural mole on its western side. Vessels may anchor at about $\frac{1}{2}$ mile from the watering place in 8 fathoms; in the wet season they should keep more on the west side of the bay in 12 fathoms, with the end of the mole bearing N. by W. Off the western point of the bay are the Contreras, two high barren rocks.

GARACHINE BAY. From Pinas bay a high, bold, and wooded coast trends northward 88 miles to point Garachiné. At about 8 miles south-west from this point is cape Escarpado, off which is an islet named Cajualo. The land over point Garachiné is lofty, and mount Zapo (5 miles from the coast), will be noticed as a sharp conical peak, rising to an elevation of about 8000 feet. Garachine bay, north-eastward of the point, between it and Paténa point, is shoal; its shore consists of low mangrove land, forming the mouths of the river Sambo, which is fronted with mud banks extending 8 miles from the coast. At the entrance of the western mouth is the Enblec of Garachiné, a small collection of huts. Fronting the bay, in a direct line between Garachiné and Paténa points is a bank $5\frac{1}{2}$ miles long, with patches of 15 feet water on it, and 4 and 5 fathoms inside; and 4 miles N.W. by W. from the former point, is a small patch of $4\frac{1}{2}$ fathoms, with 6 and 8 fathoms close to it. There is anchorage close off either of these points, the water being deep in their vicinity.

SAN MIGUEL BAY, is immediately north of Garachiné bay. The entrance is $6\frac{1}{2}$ miles wide, between Brava point on the north and Paténa point on the south. At about 2 miles E.S.E. from Brava point is Lorenzo point, off which, within the bay are Iguaña and Napoleon islets, the former is about $1\frac{1}{2}$ miles long, and is the larger of the two—8 miles northward of these is the mouth of the river Congo.

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From Iguana island eastward the bay opens, being nearly 11 miles across, and at 7 miles north-eastward of the island is Pierce point, a rocky projection on the north shore. The western side of the bay between Lorenzo and Pierce points is little known, but is reported to be shoal. The eastern side has plenty of water along it; off Paténa point, which is just separated from the main enough to make it an island, there is no known danger; at 2½ miles inside this, in a N.N.E. direction, is Colorado point, bold and rocky, with a conspicuous patch of reddish clay on its face, the coast between forming a bay. The land then for 1½ miles gradually decreases in height to Hamilton point, when it falls back to the eastward, and bends round again to the north, forming a bay 8½ miles across, with low mangrove shores, having a village and anchorage in it; but as there are some ledges of rocks in this bay that do not always show, great caution is necessary in using it, and a boat should be first sent in to point out the deep water.

In the entrance to San Miguel bay, at a short distance from the north shore, there is an extensive bank, named Buey, upon which the sea breaks heavily; it is 6 miles in circumference, and some of its patches are dry at low water. Its inner edge lies nearly 1½ miles south-westward from Lorenzo point; the passage between should not be used, as there are only 10 feet least water in it, and generally a heavy swell. A spit of 12 feet extends 1½ miles from its south-west end; and as only 4½ fathoms are found at nearly 5 miles south-west from the bank, vessels should not stand within that depth. Colorado point, kept open of Paténa point bearing N.E., is a good mark to clear this bank, and also for running into San Miguel bay.

At about 12 miles eastward from Lorenzo point, and consequently within the entrance of San Miguel bay, is Washington island, an islet 8 cables length long, as many broad, and densely covered with wood. It lies nearly 8½ miles N.N.E. from Hamilton point, and between it and the nearest shore are several islets and rocks. The channel up the bay is northward of this island, between it and Jones island, a conspicuous little rock about 20 feet high, and covered with grass, lying 1½ miles to the N.W. by W. of it.

The coast from abreast of Washington island takes a northerly direction for about 6 miles to Stanley island; in this space are several little bays, lined with mangrove, the points generally being of small elevation, rocky, and covered with bush. The channel is between the coast and a group of islands on the west, of which the easternmost is named Strain; this little island is about 25 feet high, covered with trees and scrub, and surrounded by a ledge of rocks extending a short distance off it towards the channel, but connected by mud banks with two islands westward of it. At this point Barry rock, an islet 20 feet high, and covered with cacti, lying about 8 cables from the eastern shore, contracts the channel to 1 mile in width; apparently there is deep water all round this rock, but the passage on its west side being by far the widest, most direct, and sounded, there can be no object in using the other. The channel continues of about the same breadth to Virago point, a distance of 2½ miles. When working through do not go within a line drawn from one islet to the other, and avoid Bains bluff, 1 mile southward of Virago point, where there is a dangerous ledge of rocks at 8 cables from the shore.

Stanley Island, a low wooded island 1½ miles long by 1 mile broad, divides the channel into two passages, both leading into Darien harbour; the principal one, or Boca Grande, being a continuation of the bay of San Miguel in a

northerly direction past the west and north sides of Stanley island, and the other, or Boca Chica, between its southern side and Virago point. The latter channel, although much shorter, is too narrow for a sailing vessel to use with safety, on account of the rapid tide in it.

Boca Chica.—This has two dangerous ledges of rocks at its outer entrance, one on each side, the passage between them being barely $1\frac{1}{4}$ cables wide; the southern ledge lies nearly 1 cable west from Virago point and only shows at low-water spring tides. The Trevan rock on the north side of the entrance uncovers at half tide about 2 cables from the shore of Stanley island. Mary island, the northern of the group before mentioned, kept just midway between the summit and north-west extreme of Jorey island, bearing S.W., is an excellent mark for clearing these dangers, recollecting that if brought on with the summit, the vessel will get on the northern ledge, and if open to the westward she will be on the opposite one; when past these rocks keep in mid-channel. A small ledge runs out a short distance from the south-east point of Stanley island, having passed which the vessel will be in Darien harbour, and may anchor, as convenient, in 5 to 10 fathoms, sand and mud. The Boca Chica is not, however, recommended, unless used at slack water, for during the strength of the tide it runs 6 or 7 knots; the eddies making the steerage difficult.

Boca Grande.—This lies between the rocks outside the Boca Chica and Milne island on the western shore, is 1 mile broad, and continues nearly the same width for $1\frac{1}{4}$ miles between Stanley island and the shore. After passing the Boca Chica steer north-westward, so as to shut in Mary island by Milne island, and do not approach Stanley island within 8 cables, as a dangerous rock, showing only at about three quarters ebb and connected by a ledge with the shore, lies off its north-west point. Milne island just touching the eastern end of the islands connected with Strain island, bearing S. $\frac{1}{2}$ E., is a good mark for running; and if working, when northward of Milne island tack directly Mary island opens of it on the one side, and when Edith island is shut in on the other. The navigable channel at this point is $\frac{1}{2}$ of a mile wide, and begins to turn to the eastward round the north end of Stanley, narrowing to $\frac{1}{4}$ a mile between Ray and Jannette islands on the north, and a large flat rock, nearly always uncovered, and a little wooded island about a cable off Stanley island on the south; following the channel, it bends back to the south-east, and continues of the same breadth between Ellen and Paley islands on the west, and the main land on the east, into Darien harbour.

Darien Harbour is a magnificent sheet of water extending 11 or 12 miles in a south-east direction as far as the village of Chupigana. It is formed by the junction of the Tuyra and Savana rivers, and the depth of water in it from Paley island as far as the mouth of the Savana, a distance of 2 miles, is from 10 to $4\frac{1}{2}$ fathoms, beyond which there is not more than 12 to 18 feet at low-water springs. The best place for anchoring is in from 7 to 10 fathoms, off the village of Palma, 1 mile southward of Price point, at about 8 cables from the western shore. The Vaguila rock, showing at about half tide, lies off the mouth of the Savana, East $1\frac{1}{2}$ miles from Palma point, with a good channel between it and Graham point, the west point of entrance to the river. The shores of the harbour are almost without exception one continuous line of mangrove, with densely wooded hills from 100 to 800 feet high a short distance inland. Palma appears to be situated on the best spot, and has an abundance of fresh water.

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The *River Tuyra* rises in lat. $7^{\circ} 40'$, and enters Darien harbour near the village of Chupigana. Twenty miles from this point, near the junction of the river Chuquanaque, are the ruins of the old Spanish fort of Santa Maria, near which were the gold mines worked by the Spaniards in the 17th century. The river is described as being navigable 6 miles beyond the town, "abreast which it was reckoned to be twice as broad as the river Thames is at London. The rise and fall of the tide there was $2\frac{1}{2}$ fathoms." The river Chuquanaque rises in lat. $8^{\circ} 50'$, westward of Caledonia bay on the Atlantic.

The *Savana River* rises in lat. $8^{\circ} 44'$, and a few miles from its source meets the river Lara, where the bottom is level with the half-tide. From this point the depth increases, 3 fathoms at low water being found $8\frac{1}{2}$ miles to the southward, and from thence to the mouth, a distance of 12 miles, the depth varies from 9 to 12 fathoms over a soft muddy bottom. The navigable entrance is nearly 1 mile wide between Graham point and Haydon bank, and the shores are low mangrove land, skirted with hills from 200 to 800 feet high, within 2 miles of the banks. H.M.S. *Virago* anchored in $8\frac{1}{2}$ fathoms, 1 mile to the north-east of Graham point.

It is high water, on the days of full and change of the moon in Darien harbour at 4h., and springs are said to rise 24 feet. The tides in the narrows run proportionally strong, and great care should therefore be taken.

Brava and Lorenzo points, forming the north side of San Miguel bay, are edged with reefs and outlying rocks, on which the sea breaks with great violence; this fact, together with the proximity of the Buey bank, makes this part of the coast dangerous, and it should therefore be avoided, even by small vessels.

Farallon Ingles.—This is a small but high island, on the edge of the shoal off the river Buenaventura, at about 5 miles northward of Brava point; there are 12 and 15 feet water on its western side. At 4 miles northward of it is Gorda point, which is bold and woody with a depth of 4 fathoms close to it.

The *Pajaros* are two small rocky islets lying off the coast, 4 miles northward from Gorda point; there is a depth of 4 and 5 fathoms off their west sides, but only 12 feet between them and the shore. At these islets a shoal commences, with 5 fathoms on its outer edge, which fronts the whole shore of the bay of Panama as far westward as Chamé point.

RIVER TRINIDAD, $2\frac{1}{2}$ miles northward of the northern Pajaros islet, has a low rocky projection forming its south point of entrance. A 3-fathoms channel was found into this river, extending $1\frac{1}{2}$ miles from the point, beyond which it was not examined. The northern bank of the river is composed of mangroves, which continue along the coast, with the exception of the bluffs of the rivers Chimán and Chepo, as far as Panama, a distance of nearly 70 miles. Shag rock, a barren islet, frequented by birds, with shoal water round it, lies $2\frac{1}{2}$ miles from this entrance.

Mangue and Majaguay, 7 miles from the entrance of the Trinidad, are high, wooded islets at tide time, but not at low water, being situated on the south-west edge of a large mud flat, which extends from the north bank of the river Trinidad. There are 10 to 12 feet water westward of them.

RIVER CHIMAN, 4 miles northward of Mangue and Majaguay, is wide at the mouth, but shoal, being dry at low water, with the exception of some small channels deep enough for canoes. The entrance is well marked by the islets just mentioned and the wooded bluffs on each side. On the eastern side, under a hill, is the small town of Chimán.

Pelado Island.—At about 4 miles W. by S. from Mangue islet, and directly off the mouth of the river Chiman, is Pelado, a small flat island, about 60 feet high. It is steep on all sides, and useful as a mark to vessels bound up the bay for Panama, which should not go eastward of it.

The coast between Pelado and Chepillo islands, the latter distant 81 miles to the north-west, consists of low river land covered with mangrove bushes. In this space are several small streams, the principal of which are the rivers Hondo and Corutu; but these are shoal at the entrance. The land north of these rivers is of some elevation; Column peak and Asses ears, about 12 miles north of Chiman, and Thumb peak, at the west extreme of the range, are conspicuous. Extensive mud banks, dry at low water, extend from 2 to 4 miles off the coast; outside these the water is shoal for some distance, hence vessels standing towards the main should tack in 9 fathoms.

Chepillo island, in lat. $8^{\circ} 55' 4''$, long. $79^{\circ} 7'$, lies off the mouth of the river Chepo, at about 2 miles from the coast. It is 1 mile long by $\frac{1}{4}$ a mile broad, low on the north side, and rises by a gentle ascent towards the south, over which is, or was, a remarkable tree, which forms an excellent mark to vessels bound up the bay. The southern point of the island may be approached as near as a mile, but the other sides are shoal, and a reef runs off its northern point in the direction of the river.

CHEPO RIVER extends some distance into the interior, having its rise near the head of the Savana river. The entrance is westward of Chepillo island, through a 10-feet channel, about 8 cables broad; there is a small hill, with a cliff under it, on the eastern bank, which, if brought to bear N.E. $\frac{1}{4}$ E. (1847), will lead through the deepest water.

At the west bank of this river the mud flat recommences, and continues to Petillo point, immediately northward of Panama. It is shallow some distance out, in front of this flat, hence vessels should not approach the coast between Chepillo island and Panama, nearer than the depth of 6 fathoms.

PANAMA is a regular and formerly a well-fortified city, standing on a rocky peninsula. It has a noble appearance from the sea, the churches, towers, and houses, showing above the line of the fortifications, stand out from the dark hills inland with an air of grandeur to which there is no equal on the west coast of South America. It is rendered still more conspicuous by mount Ancon, a beautiful hill, 540 feet high, rising nearly a mile westward of the city, to which it forms a pleasant background; on each side of Ancon are flat hills, with copes of wood and savanas, grassy slopes and wild thickets, while southward of the city the cultivated islets of Flamenco and Perico complete the scene.

The site of Panama has once been changed. The old city, built in 1518, which was taken and destroyed by the buccaneers under Morgan in 1678, stood at the mouth of a creek, about 4 miles north-east of the present city. The spot is now deserted, but well marked by a tower, which, together with an arch, two or three piers of a bridge, and some fragments of wall, are the only remains of a once opulent city. The tower, in the afternoon, is still a conspicuous object from the anchorage.

The expectations formed of the modern city of Panama, as seen from the sea, are by no means realised on landing. The principal streets extend across the peninsula from sea to sea, intersected by the Calle Real or Royal street, which runs east and west, and has a quiet and stately, but comfortless, air. Heavy balconies in the upper stories are but little relieved by the unglazed grated windows, or any variety in the buildings.



N.W. Part of PANAMA BAY.

Scale of Miles

0 1 2 3
N. E. Bastion $8^{\circ} 56' 56''$ N
 $79^{\circ} 31' 9''$ W.

Cerro Cabra

R. Palmar

Venado

Corcové

34

54

6

7

8

9

10

Los Hermanos

R. Palmar

Bruja Pt

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Var. 7° 10' E.



TABOGA ISLE

TABOGUILLA

Parallon

Sunk Rock

Urava

A The Flag staff on McAdams in one with the 5th Stemple of the Cathedral.
B The south Stemple of the Cathedral half way between the E.E.S.E. Bastions.

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The houses, mostly in the old Spanish style, are of stone, the larger having courts or patios; the public edifices comprise a cathedral, five convents, a nunnery, and a college, but most of these are in ruins. The cathedral is a large, lofty building, on the west side of the Plaza, but the structure is hardly worthy of its situation, the towers alone redeeming it from insignificance, and forming, in the distance, an ornament to the city. The fortifications are well constructed, but like the rest of the city in many parts are in ruins, the north-east bastion having fallen in 1845; the south and west ramparts are still in good condition, forming a pleasant promenade. A great want is felt in Panama with regard to drainage. This is caused by neglect; for the elevation of the peninsula on which the city stands, together with the great rise of the tide, offers considerable advantages for cleansing the city, which duty at present is performed by the heavy rains of the wet season.

The gold discoveries of California and British Columbia, by increasing the colonization and developing the great agricultural resources of those countries, have effected a change in the fallen fortunes and grass-grown streets of Panama; and comfortable inns and large well-stocked stores have been called into existence by the continuous transit of emigrants from Europe and the United States to San Francisco and Victoria.

The suburb of Santa Ana, situated on the isthmus which connects Panama with the mainland, is almost as extensive as the city, though not so well built. At its northern extreme is the terminus of the Panama railway to Colon or Aspinwall, on the Atlantic, a distance (by rail) of 47 miles. This railroad was only completed in January 1855, since which time the company has been constantly making improvements, until it is now one of the best appointed lines extant.

Some idea of the increasing trade of the isthmus of Panama may be formed from the fact that in the first week of June 1860 no less than 10 steamers arrived and sailed,—5 from Panama and 5 from Colon—all of them being sea-going vessels, of between 1000 and 2000 tons. These steamers, or others on the same lines, make regular semi-monthly trips direct from the isthmus to upwards of 50 different ports, in no less than 15 distinct countries. To carry on this trade a large fleet of first-class steamships is constantly employed, and few people, even among those engaged in the trade of the Pacific, have any idea of the amount of traffic these vessels bring to the isthmus. No less than 38 sea-going steamers, many of them registering from 2000 to 8000 tons, either arrive at or depart from the ports of Colon and Panama every month.

The merchants of the entire west coast of America, from British Columbia to Chile, receive their European mails and export all their specie *via* Panama. These facts will show the importance of this narrow neck of land. Every day the transit business increases, and promises soon to restore Panama to her old position, so well described by Dampier, when she was the highway between Spain and her colonies in the Pacific.

Panama affords the usual supplies which are to be obtained in tropical regions, but in 1857-8-9 they were generally dear; provisions of excellent quality may, however, be obtained from the United States by ships requiring them; and, when time will admit of it, getting such from the States is far preferable to purchasing in the markets of Colon or Panama, which in the above years were generally supplied with articles of an inferior quality; biscuit especially will not keep in the hot climate of Panama. The United States squadron have all their stores and provisions sent across the isthmus.

Water can be obtained at Panama from the tank of the U.S. mail steamers; but it is cheaper at Taboga, where it may be purchased at two dollars a ton. Coal may be bought here at times from the mail companies, but it is generally dear; the cost of coal imported into Panama by way of Cape Horn being 16 dollars per ton, and by the railroad 15 dollars, (1860.) Consuls of all nations reside at Panama.

The home value on most of the products of this country has advanced very much since the completion of the railroad. Large quantities of Peru bark, balsam, cochineal, cocoa, coffee, hides, india-rubber, indigo, logwood, oil (whale and cocoa-nut,) sarsaparilla, vanilla, gold, silver, and hundreds of other commodities of the Pacific, seek a market *via* this great central route of the globe. In 1858, 142 vessels, of 22,084 tons, entered inwards, and 186 vessels, of 94,912 tons, cleared outwards; the value of imports being £11,878,424, and of exports £2,468,208. The population of the isthmus in 1858 amounted to 144,108 persons. The population of the city in 1860 was about 10,000.

The geographical position of the isthmus of Panama, the absence of high mountains, and the vast extent of forests and other uncultivated parts, tend to produce a hot and rainy climate, which nevertheless, with the exception of a few localities, as Chagres, Colon, and Portobello, is healthy and more favourable to the constitution of Europeans than that of most tropical countries. The most prevalent disease is intermittent fever, which makes its appearance during the change of the season; remittent fever is less frequent, but generally proves fatal. On board ship, Panama is by far the most healthy place on the coast of Central America. Vessels of war have remained here many months at times, their crews continuing in a healthy state, excepting those men who had the will and opportunity to indulge in the vile spirit (*aguardiente*) of the country, which is cheap and easily procured. The yellow fever that existed at the Morro of Taboga in the early part of 1859 was confined to that spot, and, with few exceptions, the victims to it were men of drunken habits, and for this reason commanders should avoid giving leave to their crews at Panama. H.M.S. *Herald*, when employed on the survey of the Bay in 1847-8, never gave leave, and although the men were constantly in the boats the crew were also healthy.

The seasons are regularly divided into the wet and dry; the former commences in the latter end of May and lasts till November. Slight at first, the rain gradually increases, and is fully established in June, when it falls occasionally in torrents, accompanied by thunder and lightning; the air is loaded with moisture, and calms or light variable winds prevail. The temperature varies from 75° to 87° Fahr.; still the atmosphere is oppressive, until cooled by the heavy rains and thunder storms before-mentioned. About the end of June the rains are suspended for a short time; and the occurrence of this phenomenon is so regular that it is looked forward to by the inhabitants, who call it the *veranito* (little summer) de San Juan, probably from its taking place almost simultaneously with the feast of St. John (June 24th.) In December the violent rains cease and the north-west wind sets in, producing an immediate change, and the climate now displays all its tropical beauties.

Dampier's remarks on the climate of Panama are too true to be omitted:—"There are no woods nor marshes near Panama, but a brave, dry champaign land, not subject to fogs or mists. The wet season begins in the latter end of May, and continues till November. At that time the sea breezes are at S.S.W., and the land winds at North. The rains are not so excessive about

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Panama itself, as on either side of the bay ; yet in the months of June, July, and August, they are severe enough. Gentlemen that come from Peru to Panama, especially in these months, cut their hair close, to preserve them from fevers ; for the place is sickly to them, because they come out of a country which never hath any rains, but enjoys a constant serenity ; but I am apt to believe this city is healthy enough to any other people.

The Port.—The port of Panama is formed by Petillo point, $1\frac{1}{2}$ miles north-eastward of the city, (a black rock, promontory with two small hills over it, between which is a rivulet admitting boats at high water,) and the point upon which the city stands, the shore between forming a bay nearly $\frac{1}{2}$ of a mile deep, the head of which is of mud fronted by a sandy beach. A great portion of this bay is dry at low water springs ; at its entrance there is a depth of 8 feet. It is here that most of the minor trade of the gulf is carried on, by means of bongos, large canoes made from trees of such dimensions that some of them formed from a single trunk have measured 12 tons. These canoes, though clumsy in appearance, are well fitted for the navigation of the gulf, and bring most of the tropical productions of the isthmus to Panama.

Petillo point, the north point of the bay, is surrounded by rocky ledges, which extend out $1\frac{1}{2}$ cables length, and have a depth of 40 feet at their extremity. Buey point, the southern horn of the bay, is the north-eastern point of the long rocky ledges that surround the eastern and southern shores of the peninsula of the city ; it is only visible at low tide. These ledges extend $8\frac{1}{2}$ cables from the north-east bastion, 5 cables from the south-east bastion in an easterly, and $2\frac{1}{2}$ cables in a southerly direction, forming a bay southward of Buey point, in which is easy landing after half-flood, on a sandy beach in front of the Monk's gate, one of the principal entrances to the city. The general landing, however, is round Buey point, at the market place on the northern side of the town. From the commencement of the suburbs on the southern side, another ledge runs off for nearly $\frac{1}{2}$ of a mile, east of which are Los Hermanos, three black rocks visible at first quarter ebb. Detached rocks, with 8 and 7 feet water between them, visible only at low water springs, lie off the south-east extreme of the rocks, the outer one being 8 cables from the reef. These ledges, composed of rock with sand patches between, although now irksome and often dangerous to boats, afford every facility for erecting substantial piers and improving the port. As yet (1859) there is no attempt at works of this description, but the daily increasing trade must produce these necessary improvements.

Guinea point, 2 miles south-westward of Panama, is the northern extreme of a large round hilly projection, which forms the western side of Panama road. Between it and the town are the mouths of the Grande, Arena, and Falfan, small rivers, with cultivated banks. The water on this side of Panama road is shoal as far as Tortola and Tortolita islands, which lie 2 miles southward of Batele point, the south extreme of the hilly projection above-mentioned. One mile E. by S. $\frac{1}{2}$ S. of Batele point is Changarmi island, surrounded by the Pulperia reefs ; and to the south-west of the point are Bruja and Venado points, rocky and projecting, with the outlying islets of Cocovi and Cocoviceta. Although these dangers are mostly above water, this part of Panama bay should be avoided.

Perico and Flamenco, with the outlying rock of San José, is a group of islands forming the south side of Panama road. Ilenao and Culebra, the western and southern parts of Perico, are connected with Perico by an isthmus

of beach and rocks; but at high water these present the appearance of three islands. Perico is the head quarters of the United States mail steamers, the bay on its northern side forming a convenient anchorage, while on the isthmus, which is sandy on that side, steamers of 2500 tons have been easily beached. Vessels using this anchorage after passing Flamenco should keep close round the north end of Perico, and anchor when the isthmus opens. Large vessels drawing over 20 feet may coal at Perico by passing west of the group at half-tide, with Ancon hill, (which on that bearing makes like a cone) just open of Ilenao, N.N.W.; pass about a cable's length from Ilenao, and anchor off its north-west end in 24 feet, when Perico opens. In both cases attention must be paid to the time of tide. The passage between Perico and Flamenco is shoal, and should not be used; that between Flamenco and San José is deep, and both islands are steep.

Danaide Rocks.—These patches of conic rocks, lying on the eastern ridge of Panama road, E. by S. $2\frac{1}{2}$ miles from the north-east bastion, have only 15 to 18 feet on them, and $8\frac{1}{2}$ and 4 fathoms on all sides. They lie awkwardly in the track of vessels standing for the anchorage, keeping their luff with the land breeze. The Hermanos rocks, in line with the hill between the rivers Grande and Falfan, bearing W. by S., lead northward of them; and the south steeple of the cathedral kept half-way between the east and south-east bastions, W.N.W., leads southward of them. This spot is a favourite fishing-place, and vessels should avoid canoes seen in its vicinity, as they are probably fishing on the rocks.

Sulphur Rocks.—This dangerous reef, 6 cables long by 8 broad, lying 1 mile north-westward of the Danaide, has a rock awash in its centre, with 6 and 9 feet around it, and outlying patches of 12 and 14 feet. The railroad flagstaff on with the centre of Ancon, bearing W. $\frac{1}{2}$ S., leads northward of the reef in 15 feet, but this passage should not be used at low water springs; and the Hermanos rocks in line with a round peak over the river Grande, lead southward of the reef in 18 feet.

The *Knocker* and *Taboga* are two rocks, with only 6 feet water on them. The *Knocker*, which is, or was, marked by a red buoy, with staff and flag on it, lies nearly 1 mile E. $\frac{1}{2}$ N. from the south-east bastion; the *Taboga* lies a little more than 2 cables length south-westward of the *Knocker* buoy, with 16 feet water between, and 12 feet in-shore of them, but no stranger should attempt to pass westward of the buoy.

TABOGA ISLAND, with the islands of Urava and Taboguilla, form a pleasant group, about 4 miles long by 2 broad, situated 9 miles southward of Panama. *Taboga*, the largest and westernmost, is 985 feet above the sea, well cultivated, and has a considerable village on its north-east side. Northward of the village is the *morro of Taboga*, a small hill, connected with the main island by a low, sandy isthmus, covered at high water; this is the head-quarters of the Pacific Mail Company, who have here a steam factory and coal stores, also a gridiron, 800 feet long, on which H.M.S. *Magicienne*, a vessel of 1255 tons, was repaired in 1858.

Vessels visit *Taboga* from Panama to obtain water and supplies, both of which are more readily obtained than at the city; water can be procured from the Company's tank. The anchorage off the village is convenient, being about 3 cables from the shore in 10 fathoms, with the peak of Urava on with the high cliff of *Taboga*, and the church from S.W. $\frac{1}{2}$ S. to West. Vessels coaling at this island should avoid giving leave to their crews; those that have not given

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Urava is a small lofty island, separated from Taboga by a narrow and shoal channel; off its southern extreme is the small islet of Terapa.

Taboguilla, 710 feet high, is well cultivated, with some islets off its south-west extreme, and forms the north-east island of the group, with a wide and deep channel between it and Urava, in the centre of which is a sunken rock just awash at low water; the sea seldom breaks over it at high water and it must be carefully avoided by closing either island, both being steep-to, or vessels may pass south of it by keeping the isthmus of the morro open, bearing N.W. by W. $\frac{1}{2}$ W. Farallon, a small islet, also lies in this channel, but it is steep-to with 11 fathoms between it and Taboguilla.

Tides.—It is high water on the days of full and change, in Panama road at 8h. 25m., springs rise from 15 to 22 feet, and neaps from 10 to 16 feet. The ebb sets south from 1 to $1\frac{1}{2}$ miles an hour, and is stronger than the flood, which runs to the north-west. The long swell which occasionally sets into the road always ceases with the flowing tide. It has been remarked by the officers of the U.S. Pacific mail steamers that there is more rise in the small bay north of the town, and also in their own anchorage off Perico, than in the more open parts of the road.

Directions.—Sailing vessels bound to Panama should endeavour to get within 8 or 4 miles of Chepillo island, especially between December and June, and so have all the advantages of the prevailing northerly wind. From this position Ancon hill will be seen, and should be kept a little on the port bow, as the wind hauls to the westward on approaching Panama. Vessels drawing over 18 feet should pass south of the Danaide rocks, by keeping San José rock* open of the west point of Taboga island, bearing S.S.W. $\frac{1}{2}$ W., until the cathedral towers are open eastward of Ancon. Having passed the Danaide rocks the ship is fairly in the road and may anchor according to her draught;—if no more than 18 feet draught she may have Tortola island just shut in by Ilenao, bearing S.S.W. $\frac{1}{2}$ W., and San José rock open east of Taboguilla island. Vessels drawing 24 feet may anchor north of Perico, with the peak of Urava island on with the east point of Flamenco, bearing South, taking care not to open Changarmi northward of Perico. If it is necessary to work up the road to an in-shore berth, tack on the western side just before Perico and Flamenco touch; and in standing to the eastward do not open San José of Taboga island.

Vessels drawing 14 feet can pass north of the Danaide and south of the Sulphur rocks, with the Hermanos rocks on with the right side of the peak, between the rivers Grande and Falfan; then San José rock on with the peak of Taboguilla bearing S. $\frac{1}{2}$ E. leads between the Sulphur and Knocker rocks; and they may anchor north of the Knocker buoy in 16 feet, keeping it between Perico and Flamenco, with Gabilan, a small rocky peninsula west of the town, just shut in by the south-east bastion. During neap tides they may anchor still further to the N.W.

* On the 25th August 1863, a light was exhibited for the first time on San José rock. It is only lighted when the steamers from San Francisco are expected, and it is visible at 7 or 8 miles.

Panama road, although shoal, may be considered secure; the ground being muddy holds well. A resident in Panama for five years, stated, that during that time there was no known case of a vessel being driven from her anchor; and with good ground tackle and common precaution a vessel might lie there all the year round with one anchor down. Attention to the tides and soundings of the roadstead will enable a vessel to lie close in at times for the discharge of cargo.

Coast Southward of Panama.—The coast southward of Panama between Bruja point and Chamé point, a distance of 16 miles, forms a shoal bay, with several outlying banks and rocky islets; hence vessels bound to Panama should keep near the island of Taboga, and not approach this shore within the depth of 5 fathoms. Vique cove, in which is a small village, is 5 miles westward from Bruja point. About 1 mile north-eastward of Vique is a lofty treble-peaked hill, called Cerro de Cabra, a conspicuous object to vessels bound to Panama, and frequently mistaken for Taboga by those coming from eastward. Vacamonte point, the western side of Vique cove, is the only break in the mud flat which fronts this land, and extends out nearly 2 miles from shore.

CHAME BAY, at the head of which is a small river of the same name, is nearly filled up by large banks, the largest of which, the Cabra spit, lies in the middle, and has on it an islet named Tabor. Chamé point, the southern horn of this bay, is a singular, low, woody promontory jutting into the sea, $5\frac{1}{2}$ miles long by $\frac{1}{2}$ a mile broad. Between it and Cabra spit is a convenient harbour, 2 miles in length by about $\frac{1}{2}$ of a mile wide, with from 8 to 8 fathoms water in it, and from 16 to 18 feet close to the beach of Chamé point. To the north-west of the river is a high range called Sierra Capéro, and to the southward are the Cerro Chamé, a group of wooded hills.

Melones Island is a small rocky islet $2\frac{1}{2}$ miles north-westward from Taboga, having at about $\frac{1}{2}$ a mile northward of it, a rock of the same name above water. The island is steep, but vessels should be careful not to pass westward of it.

Chame Island, with the Perique rock, are of a similar character to Melones, and situated about the same distance southward of Taboga.

Valladolid is a large rock, nearly 2 miles south-westward of Chamé island, having 9 and 10 fathoms close to it.

Otoque and Bona Islands, with Estiva island and the Redondo rock lying 6 miles south-eastward from Chamé point, form a group similar to but somewhat smaller than Taboga and Taboguilla. A village, named Goleta, is in the bay on the western side of Otoque. Anchorage, in from 10 to 14 fathoms, may be found in any part of this group, and all dangers are above water. These islands being high and peaked, form good land-marks to vessels on this side of the gulf of Panama.

PARITA BAY.—From Chamé point the coast runs south-westward 45 miles to Parita bay, and consists throughout of a beach named Playa Grande, which is backed by a low wooded bank. There is a depth of 4 and 5 fathoms at about 2 miles from this beach, except S.S.E. $\frac{1}{2}$ E. of the Cerro Chamé, where there are only 4 fathoms at nearly 7 miles from the land, the bank extending from that to Chamé point. To avoid this, vessels from Parita bay should shape a course to pass about 2 miles southward of Bona until Taboguilla is nearly touching Otoque, bearing N. by E. $\frac{1}{2}$ E., when they may steer up the bay, inside but nearer to the islands.

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The mud-flats are found again on the western side of Parita bay, the coast being a low mangrove shore, intersected by the mouths of no less than five small rivers; the land to the westward is also low with several hummocks. At Liso point on the south side of the bay the hard bank with sandy beach in front again commences and continues as far as cape Mala, a distance of 88 miles, the coast trending to the south-east.

Parita bay is about 18 miles long north and south, and 10 miles deep, and has soundings of 18 fathoms at 10 miles from the shore, thence gradually decreasing to the land. It is exposed to all winds blowing from eastward.

Iguana Island.—At about 80 miles south-eastward of Liso point, and 9 miles northward of cape Mala, Iguana island, which is a little higher than the adjacent coast, forms a conspicuous object. A ledge extends about 3 cables from its southern and also from its eastern point, and a reef is said to stretch to the N.N.E. from its north point, but otherwise the island is steep-to with 15 fathoms in the channel between it and the main.

It is high water, full and change, at Iguana island at 4h.; the rise and fall being 15 feet. The flood sets northward, and the ebb south-eastward, the latter being considerably the stronger, especially between December and June.

CAPE MALA, which forms the western point of entrance to the gulf of Panama, is a low but cliffy point with outlying rocky ledges, having deep water close to them. The land from the north-west slopes gradually to the sea at this point from a considerable distance, making the exact cape difficult to distinguish, unless the breakers are seen. On opening the gulf round this cape, a strong southerly set is generally experienced, especially in the dry season.

PEARL ISLANDS.—These form an archipelago on the eastern side of Panama bay, consisting of sixteen islands and several rocks. Rey is the largest, San José, Gonzales, Casaya, Saboga, and Pacheca are of secondary, and the rest of minor importance. There are from 30 to 40 fishing villages scattered about these islands, the inhabitants of which are chiefly engaged in the pearl fishery. The islands are low and wooded, the soil fertile, but not much cultivated, and the numerous coco-nut groves, and bright sandy beaches, intersected by small rocky bluffs crowned with trees, give them a pleasant appearance; most of them belong to merchants at Panama, who employ negroes to plant and cultivate them.

Pacheca, Saboga, and Contradora Islands, with the islets of Bartholomew and Chipre, form the northern part of the archipelago, and between them is a good and capacious harbour, well suited as a depôt for steamers. Saboga, the largest island, on the east side of which is a considerable village, has a reef extending $1\frac{1}{2}$ miles in a northerly direction; Contradora has 5 fathoms close to its north-west shore, which is low and well adapted for wharves. This harbour, which is about 2 miles long by nearly 1 mile broad, with an average depth of 9 fathoms, has Saboga on its western side, Contradora on its south-east, and Pacheca and Bartholomew on its north side; it has three entrances, each possessing a 5-fathom channel, which may be used according to wind and tide. The Pacheca channel lies southward of Pacheca, between it and the reef extending from Saboga; the Contradora channel is round the northern end of Contradora island; and the Saboga channel is between that island and Contradora.

It is high water, full and change, at Saboga island at 4h., and springs rise 14 feet.

Vessels using the Pacheca channel should pass within $\frac{1}{2}$ a mile of the islet west of Pacheca, and stand southward until the centre of Bartholomew island bears E. by S. $\frac{1}{2}$ S.; then keep it on this bearing until the northern islets off Saboga open westward of Saboga, or the west end of Contradora bears S. by E. $\frac{1}{2}$ E., when they should haul southward for the anchorage.

Entering by the Contradora channel, they should pass $\frac{1}{2}$ a mile eastward of Bartholomew island and not stand to the westward before the nearest islets north of Saboga open northward of Saboga; these islets kept just open bearing W. by S. lead through. Care must be taken not to open them too much, as there is a 2-fathom patch off the north-east end of Contradora.

Vessels from eastward using the Saboga channel should steer in with the outer islet on the reef extending from the south end of Saboga bearing W. $\frac{1}{2}$ S., as this will lead clear of the Sunk rock, a patch lying nearly 1 mile off the south side of Contradora; and, when Pacheca is shut in by Saboga, bearing N. $\frac{1}{2}$ W., they should steer northward, and run through the channel which is steep on both sides. There is a channel northward of the Sunk rock, but that south of it is wider and better.

Approaching the Saboga channel from westward, sail close to the islet of Santa Catalina, which lies about $1\frac{1}{2}$ miles south of Chipre, to avoid the shoal extending from the latter island. From Catalina steer N.E. for the north end of Chaper, the island next south of Contradora, until Pacheca touches Contradora, bearing N. by W.; then steer N.N.W. $\frac{1}{2}$ W. for a small hill on Saboga, taking care *not to shut* in Pacheca with Saboga until the north point of Chipre bears southward of West, and that Pacheca is *shut in* before the south point of Saboga bears West, then stand for mid-channel as before.

Chaper and *Pajaros*, the islands immediately southward of those just mentioned, are separated by a 4-fathom channel in which the ground is foul and consequently not safe to navigate. A shoal with 13 feet water on it lies 1 mile eastward of Pajaros, and southward of that island the soundings are rocky and irregular. No vessel should attempt the passage south of Chaper and Pajaros islands—between them and Rey island.

Casaya, *Bayoneta* and *Viveros*, are the largest among the numerous islands on the reef extending from the north-west point of Rey island; the passages between them all are foul, with occasional strong tides. At nearly 4 miles eastward of the north point of Casaya is a bank $1\frac{1}{2}$ miles long by $\frac{1}{2}$ of a mile wide, having only 9 feet water on its shoalest part; and at about 2 miles from the north-east point of Viveros are the Caracoles and Cangrejo islets, with foul ground around them. The whole of these islands should be avoided by vessels bound up the bay, by approaching their western side not nearer than just to open San José island eastward of Pedro Gonzales island, bearing S. by E.; while on their eastern side, they should not open San Pablo, a small islet off the north-east point of Rey island.

Rey, the principal of the Pearl islands, is about 15 miles long, in a north and south direction, by 7 broad; it has several peaks on it, the highest of which is about 600 feet above the sea. Numerous islets, having deep water between them, lie 8 miles off its western shore, and these should not be approached by strangers within the depth of 10 fathoms. Cocos point, its southern extreme, is a remarkable promontory, 4 miles long by about one wide, the extreme cliff of which was crowned in 1859 by an umbrella-shaped tree. On the east side of this promontory is the bay of St. Elmo, where is convenient

anchorage, and a good stream of water at Lemon point at its head; the soundings in this bay are 10 to 6 fathoms, the latter being at a short distance from the shore.

The eastern shore of Rey has also islands off it, which may be approached to $\frac{1}{2}$ a mile, with the exception of that named Canas. This is an island about 6 miles northward from St. Elmo bay, the larger of two islands separated from the shore by a narrow channel; it has off it a sunken rock at nearly a mile distance, and $\frac{1}{2}$ of a mile outside this is a patch of 3 fathoms;—to avoid these sunken dangers do not open Mongé islet, eastward of St. Elmo, until Pablo islet opens eastward of Muerta, a small barren islet lying about $1\frac{1}{2}$ miles north-eastward of Canas.

San Miguel, the principal town of the Pearl islands, is on the north side of Rey. It is of some size, and has a conspicuous church, but is badly situated, landing being difficult at low water. Two hills—the Cerro Congo and Cerro Vali—rise southward of it, the former being 481 feet high. Vessels having to lie off the town should run in between Caracoles and Cangrejo, and anchor in about 6 or 7 fathoms, when the church is shut in or behind Afuera, an islet lying off the town, bearing S.E. by S. The bottom in this anchorage is irregular and rocks are numerous, hence more than ordinary care is required.

A small island, named *Galera* lies $7\frac{1}{2}$ miles E. $\frac{1}{2}$ S. from Cocos point, the southern extremity of Rey, its position being lat. $8^{\circ} 11\frac{1}{2}'$, long. $78^{\circ} 45\frac{1}{2}'$. Its southern side, consists of a steep sloping down to a beach on the north, and to the southward a reef runs on for nearly 1 mile. This island is generally the first land made by vessels bound to Panama from south-eastward; it should not be approached within the depth of 10 fathoms, but there is a good passage between it and Cocos point, by using which the vessel will be clear of the San José bank.

A shoal named *San José* lies about 9 miles in an E.S.E. direction from Galera island, and immediately faces the entrance to San Miguel bay, its position being 14 to 17 miles from Garachiné point, the south point of the bay, between the bearings from it of W. by S. and W. $\frac{1}{2}$ N. It consists of a bank of 7 to 8 fathoms, which extends N.W. $\frac{1}{2}$ N. and S.E. $\frac{1}{2}$ S. 8 miles, and is in no part more than $\frac{1}{2}$ of a mile broad. Close to it all round is a depth of 12 to 18 fathoms, which in a westerly direction deepens to 20 fathoms at less than a mile. In the centre of this bank is the Trollé rock, having only 2 feet water over it at low tide; it bears W. $\frac{1}{2}$ S. 13 miles from Garachiné point, and E.S.E. 9 miles from Galera island. The shoal upon which this rock stands is 1 mile long by about $\frac{1}{2}$ of a mile broad; the depth close to the rock is $3\frac{1}{2}$ to 6 fathoms, and there are 7 and 8 fathoms on its outer edge—vessels should not therefore approach it within the depth of 10 fathoms. The rocks may be easily avoided, either by keeping on the main shore until Garachiné point bears southward of East, or by passing about 2 miles from Galera island, taking care at the same time not to run on the shoal patch and rocks off the southern side of the latter.

Pedro Gonzales is separated from the islets off the west side of Rey by a broad deep channel. It is about 12 miles in circumference, and has on its northern side two bays protected from the north by the islands of Senora and Senorita. These bays called Perry and Magicienne, are divided by the little peninsula of Trapiche, off the east point of which is a rocky ledge, terminating in a shoal with 14 feet water, at a distance of nearly 8 cables from the point; inside this, to the southward, there is a small anchorage in $4\frac{1}{2}$ fathoms.

A large stream of water runs into the sea on the western side of Magicienne bay. This bay, however, is small and shoal, without the advantages of Perry bay, which is 1 mile wide, and runs back for the same distance. Senora and Senorita, including the shoal off their eastern side, are about 1 mile long, and lie nearly the same distance northward of Trapiche, with a 7-fathom channel between, steep on both sides.

It is high water, on the days of full and change of the moon, in Perry bay at 8h. 50m.; and the rise is 16 feet. The tide stream is not felt in the anchorage, but there is a considerable set off the island, the flood running to the northward, the ebb to the southward, the latter being generally stronger.

Vessels may pass on either side of Senora and Senorita; if on the east side, avoid the shoal extending from them by keeping the eastern point of Gonzales island, a rocky peninsula, open of the point next north of it, bearing S.S.E., until the north end of Senora is shut in by Senorita, bearing N.W. by W. $\frac{1}{2}$ W. Going into Perry bay, a good look-out must be kept for the shoal running off E.S.E. from Trapiche island.

At nearly $1\frac{1}{2}$ miles S.S.W. $\frac{1}{2}$ W. from the rock off the south end of Pedro Gonzales, there is a dangerous rock, awash or nearly so at low tide, named Passage rock, from the circumstance that it is in almost mid-channel between Pedro Gonzales and San José. It has soundings of 12 and 9 fathoms close to it, and 7 to 5 fathoms at a short distance northward of it. The mark to lead rather more than $\frac{1}{2}$ a mile southward of it is,—the peak next south of the highest on Rey island, just open southward of Coco islet, one of the outlying islets off the west side of Rey, bearing E. by N. $\frac{1}{2}$ N., vessels should keep between the San José shore and this mark.

San José, 4 miles South of Gonzales, is about $6\frac{1}{2}$ miles long by 8 broad, and its summit consists of table land. At nearly 2 miles south-eastward from Iguana point, its northern extreme, is a large waterfall, flowing into the sea, and forming an excellent watering place. At the south-east side of the island there is a bay, in which are soundings of 8 to 5 fathoms, but, as the swell sets in there with great violence, it is not convenient for shipping. Off the southern point of the island are a number of high rocks of singular and fantastic shape; this part of the island should be avoided. The western shore is bold and cliffy, with a small bay near the centre.

The navigation of the approaches to the gulf of Panama, situated as they are in the region of the doldrums, with the land of Central America considerably affecting the northern trade, becomes to a vessel unaided by steam one of the most tedious, uncertain, and vexatious undertakings known to the sailor. Steam power will considerably simplify these difficulties, but the experiences of a sailing vessel may materially assist the navigation of the auxiliary screw steamer in this portion of the Pacific.

WINDS.—Between cape Corrientes and Panama, the prevalent winds are from northward and westward, with frequent squalls and wet weather from the south-west between the months of June and December.

In the gulf of Panama the winds are regulated by the seasons; the prevalent wind, however, is from northward. In the fine season, commencing in December, these winds are regular and constant, bringing fine dry weather. Southward of the gulf they blow much harder, and off the coast of Veragua a double reefed topsail breeze in January and February is not uncommon. In

April and May the northerly winds are less regular, and have more westing in them, with calms, light sea, and land breezes, with occasional squalls from the south-westward. In June the rainy season sets in, and the southerly winds become stronger. Still the old north-west wind is mostly found after noon, and vessels sailing from Panama at all seasons will generally have a fair wind until south of cape Mala.

Between the Galápagos islands and the coast, westward of the meridian of 80° , and southward of the parallel of 5° N., the winds are between South and West all the year round, and except between the months of February and June they are of sufficient strength and duration to make the navigation easy; but northward of lat. 5° , between 80° and 110° W., is a region of calm and doldrums, accompanied by rains and squalls of a most vexatious description. The weather met with can hardly be better illustrated than by the facts that in May 1848 H.M.S. *Herald*, in her passage towards the Sandwich islands, although towed for 6 days as far west as $89^{\circ} 20'$, still took 40 days from Panama to 110° W., owing to keeping between the parallels of 8° and 10° N., and in March of the following year, in the meridian of 87° , and the lat. of 8° N., only made 80 miles in 9 days.

CURRENTS.—The Gulf of Panama is also subject to varying currents, partly caused by the peculiar formation of the land, and apparently influenced in turns by the Peruvian or Mexican streams, according as the relative strength of each predominates. Thus Malpelo island is surrounded by a strong current, having much the appearance of breakers. Here Colnett found the current setting strongly into the gulf N.E. by E. at the rate of $2\frac{1}{2}$ miles an hour, while other navigators describe it as running violently in the opposite direction. That these varying statements should be equally correct is not at all incompatible, considering the position of the island amidst conflicting winds. This uncertainty is another embarrassment to the navigation between Panama and the Galápagos. A steady current, however, has generally been found to set northward after passing cape San Lorenzo, extending off shore for about 60 miles. This stream runs along the coast of the continent, round Panama bay, and then sets with considerable force, especially in the dry season, southward down the western side of the bay. After passing cape Mala it meets the Mexican current from the W.N.W. and thus causes the numerous rippings and short uneasy sea so often met with at the entrance of the gulf. This troubled water will be found more or less to the southward, according to the strength of the contending streams.

PASSAGES.—From the foregoing it will be seen that the passage from southward into the gulf of Panama is easily made during the greater part of the year, by keeping about 60 miles from the coast north of Guayaquil, and after crossing the Line shaping a course for Galera island, at the same time taking care, especially in the dry season, to stand in-shore with the first northerly winds. By so doing vessels will most probably have the current in their favour along the coast; whereas by keeping in the centre or on the western side of the gulf, a strong southerly set will be experienced.

After making Galera and clearing the San José bank, the navigation between the Pearl islands and the main is clear and easy, with the advantage of being able to anchor, should the wind fail and the tide be against the vessel. As a rule, this passage should be taken, but with a strong southerly wind, the navigator is tempted to run up the bay, in which case he should keep towards the western shore of the Pearl islands, where anchorage and less current

will be found should the wind fail, an event always to be expected in these regions.

Vessels bound to Panama from northward should make the island of Hicaron, which lies about 50 miles westward of Mariato point, and from this endeavour to keep under the land as far as cape Mala. If unable to do this, they should push across for the opposite coast of the continent, when the current will be found in their favour. On getting eastward of cape Mala the safest plan is to shape a course for Galera island and to use the eastern passage. At the same time, if tempted up the gulf by a fair wind, vessels should endeavour to get on the western coast of the Pearl islands, which have the advantages already explained.

The great difficulty, however, is the passage out of, or rather, from Panama bay. Pizarro, the first man who attempted this, in November 1525, after beating about for 70 days was forced to return to the river Chiman, on the eastern side of the bay. The best plan for all sailing vessels, whether bound north or south from Panama, is to push to the southward and gain the S.E. trade; by so doing they will not only avoid the doldrums and vexatious winds before described, but will have the additional advantage of salubrious weather, with the sea at a temperature of 75° instead of 88° Fahrenheit. The passage northward has been made by keeping close in-shore after passing cape Mala, and navigating by the sea and land breezes; but this should only be attempted by vessels that are well found and manned, unless they are bound to the ports of Central America, when it is their only route.

The following directions, the best for sailing vessels, are chiefly by Lieut. Maury, of the U.S. Navy.

From the bay of Panama a vessel should make the best of her way south until she gets between lat. 5° N. and the equator; on this course let her endeavour, if possible, to keep near the meridian of 80° W. From this make a S.W. course if the winds will allow. Should the wind be S.W. stand to the southward, but if S.S.W. stand to the West, if a good working breeze; but if it be light and baffling, with rain, the vessel may know that she is in the doldrums, the quickest way to avoid which is by getting to the southward.

From lat. 2° N., between June and January, vessels may stand on from the coast to the westward, and pass northward of the Galápagos islands, taking care to keep southward of 5° N. As far as 95° they will have South and S.S.W. winds; but after that meridian the wind will haul round to the southward, and vessels bound to the South Pacific may consider themselves fairly in the trade. Vessels bound northward, after passing the meridian of 100°, may edge away for the Clipperton rock; after passing which they may push to the northward for the northern trade.

Between February and June it is better to cross the Line before pushing to the westward. This will generally take a week, which outlay of time, however, is far preferable to encountering the vexatious weather met in that season north of the Galápagos. In this route it must be remembered that southward of lat. 1° N. the wind hauls to the eastward as the vessel leaves the coast, and in the meridian of 88° it is frequently found eastward of South; but at the same time, vessels in standing off before crossing the equator, must take care to avoid being driven to the northward of that latitude. In fact, there are few passages in which so much depends on the skill and experience of the pilot as in leaving the gulf of Panama.

Vessels bound to the northward in the above season should keep south of

the Line until westward of 105° , when a course may be shaped for 10° N. and 120° W., in which track they will probably find the northern trade.

The above difficulties will be easily avoided by auxiliary screw steamers, which vessels may at once proceed to the starting points above mentioned. The best plan will be to steam for the meridian of 85° W. on the equator, from which position a course may be shaped, according to their destination, and to the season of the year. From that point their sails will be found to be as powerful as their engines.

The following facts will show the singular advantage of even small steam power in these regions:—There was in 1859, an indifferent, old, screw steamer, the *Columbus*, belonging to the Panama Railway Company, that had been running with great regularity for upwards of a year between Panama and San José de Guatemala, a distance of about 1020 miles, calling at Punta Arenas, Realejo, La Union, and Acajutla, both going and returning,—at each place discharging and receiving cargo and mails,—and sailing from Panama on the 17th of every month, and returning to that port on the 6th of the following; thus making the round in 19 days. It is estimated that it would take 2 months for a sharp sailing vessel under favourable circumstances to perform the same work.

CAPE MALA TO CAPE CORRIENTES.

The coast from cape Mala trends sharply westward, and continues low so far as Guanico point, a distance of 22 miles. From this point it gradually rises for 7 miles to the Morro Puercos, a lofty headland, which forms the commencement of a range of high coast land. North-eastward of Guanico point is an open bay, into which two small rivers, the Tomosi and Juera, empty themselves.* From Puercos point the coast trends 27 miles to Maraito point, a bold headland at the termination of the high land of which Morro Puercos is the commencement; this point is a good landfall for vessels bound to Panama from westward, as by keeping under the land eastward of it they will avoid the southerly current setting from the gulf.

Frailes.—These are two low barren islets situated 11 miles south-westward from cape Mala, and about 18 miles north-eastward from Puercos point. They are distant from each other 2 miles in a N.N.W. $\frac{1}{2}$ W. and S.S.E. $\frac{1}{2}$ E. direction, and are clear of outlying dangers, with the exception that a reef extends out about a cable's length from the north-west point of the southern islet. The depth within $\frac{1}{2}$ a mile of them is 20 to 30 fathoms.

At 18 miles westward from cape Mala is a projecting point named Raia, off which is an islet and reef of rocks, known as the Benado. At about midway between the rivers Juera and Tomosi, is a patch of rocks at a short distance from the shore. A reef, 8 fathoms under water, lies about 8 miles north-eastward from Puercos point, and another, above water, is distant 4 miles westward from the point; the latter is at about a mile from shore. Hence to

* In this bay vessels occasionally anchor, with the wind from the land, near the islet Benado, and obtain fresh water from the river Juera. As the anchorage is exposed to southerly winds, it can be considered only a temporary stopping place.

Mariato point, the soundings are very deep, as at 8 miles from the shore the bottom is not reached with a line of 100 fathoms.

From Mariato point the coast trends 5 miles north-westward to Naranjas island, a rocky but wooded islet lying about $\frac{1}{2}$ a mile off a bluff; it is steep, with 10 and 20 fathoms at a short distance from it. Northward of this islet the low land again commences, and continues into the great bay of Montijo.

MONTIJO BAY.—From point Mariato the coast trends N.N.W. 20 miles to the eastern entrance of a large bay, named Montijo. This bay extends northward about 14 miles, with an average breadth of 9 miles, and is fronted by two islands, Cebaco and Gobernador of which the former is the larger and southernmost. Within the bay, near its head, is an island named Leones, having on each side of it a river accessible only by boats. The bay is of little value to shipping, the soundings in it being extremely irregular, and over the greater part of its surface only 10 to 12 feet; hence it is but seldom visited.

Cebaco is an island of irregular shape, 18 miles long in a N.E. by E. $\frac{1}{2}$ E. and S.W. by W. $\frac{1}{2}$ W. direction, and 8 miles wide at its eastern end, its broadest part. Some detached rocks lie off its western end; and, a sunken rock lies about a mile from its eastern point, leaving no safe channel between. When entering the bay by this, the east channel, it is necessary on account of this sunken rock to keep nearer to the main than the island,—in steering thus the depth will be 12 to 10 fathoms; continue now in a north-westerly direction and pass St Juan rock, distant about $1\frac{1}{2}$ miles from the land, on its west side; the depth will now have decreased to 4 fathoms; hence to the east side of Leones island the passage is westward of several rocks lying off the shore, in soundings of 6, 7, and 9 fathoms.

Gobernador island, between the west end of Cebaco and the main, is about $1\frac{1}{2}$ miles in extent, and divides the western entrance into Montijo bay into two channels, either of which can be taken according to circumstances, although the northernmost is the better, being wider and less exposed to the strong outward current from the bay. The depth in the southern channel is 9 to 7 fathoms, and in the northern 16 to 6 fathoms. When the bay is fairly entered, vessels of light draught may anchor on its west side, and find good shelter from almost all winds.

When tacking in Montijo bay the utmost caution is necessary on account of the shoal of 12 feet which extends the whole length of the bay and connects the northern side of Cebaco island with Leones island. This shoal occupies a large part of the surface of the bay, and leaves but a narrow channel on each side of it.

BAHIA HONDA.—From Montijo bay to the entrance of Bahia Honda the distance is 20 miles in a W. by N. $\frac{1}{2}$ N. direction, and the shore between is rugged with several islets and rocks off it. At the distance of 2 miles from the land the soundings are 27 to 35 fathoms, the latter being in the vicinity of Bahia Honda. In the event of running from one bay to the other, the coast should have a berth of not less than 8 miles.

The bay consists of an inlet nearly 8 miles in extent in a N.E. direction, and about 2 miles broad, in which are soundings of 20 to 10 and 4 fathoms. It affords shelter from all winds, and a berth may be selected according to circumstances in almost any part of it. The head of the bay, north-east from Talon island (subsequently mentioned) is shallow, but may be safely approached by the lead. When running in it is only necessary to keep in mid-channel.

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from a great distance, but a near approach reveals it with distinctness. The north point, Guarida, is bold, with a depth of 14 to 10 fathoms close to the rocks at its base. The south point, cape Jabali, has two islets off it, named Sentinela and Cono, of which the former is the larger and northernmost; these islands are connected by a sunken reef, and there is a narrow passage between them and the shore only suitable for boats.* Within the bay and immediately facing the entrance is Talon island, having two small islets close to its west side, of which the larger and northernmost is named Pueril; the island close to its south end is named Espuela. Talon island is about 120 feet high, and divides Bahia Honda into two parts, known as Chinche and Legamo bays; Chinche bay is west of the island. Only vessels of very light draught can pass round the north end of Talon island. In 1854, the island was inhabited by some Indian families, from whom were procured eggs, fowl, and various kinds of fruits, and as the bay affords abundance of excellent fish, such could also without doubt have been obtained from them.

Fresh water can be procured here in great abundance and especially from a stream named Cobre, which falls into the south-east part of the harbour, and can be ascended some distance in a canoe. There is a watering place on the south side of the bay, S.S.E. from Talon island, which is even more convenient than the stream just mentioned, because a boat may in calm weather anchor alongside it and obtain supplies by means of a long hose. Very good water may also be procured from a cascade outside the harbour, on the north shore, at about $1\frac{1}{4}$ miles from point Guarida; the water falls upon a rock, which affords considerable facilities for fixing a hose.

It has been mentioned that anchorage can be obtained in almost any part of Bahia Honda, but that which is perhaps the most convenient for large vessels is westward of Talon island, in Chinche bay. Here the French surveying vessel *Obligado* anchored (in 1854,) in 14 fathoms, mud, with point Guarida bearing S. 40° W.; Sentinela islet S. 14° W.; east point of Espuela islet S. 88° E.; east point of Sapo islet N. 80° E.; and the west point of Chinche islet N. 15° W. The only known dangers in the vicinity of this anchorage are a sunken rock of 8 feet at $1\frac{1}{4}$ cables length northward of point Guarida, and a reef at about the same distance north-westward from Pueril island.

When the *Obligado* was at Bahia Honda the tidal observations showed the flood and ebb to have nearly equal strength, of the two the ebb preponderating. High water at full and change 8h. 30m., and the sea rose $11\frac{1}{2}$ feet.

Making Bahia Honda.—Coiba island and the little island Afuera (between Coiba and the main) immediately face Bahia Honda, hence these islands will be first seen from whatever quarter the bay is made. At about 2 miles from the harbour are two islands named Medidor and Pacora,† situated off the north shore, of which the former is the larger, of moderate height and nearer the land; these islands must be left to northward when running for the bay. The entrance is by no means difficult, but it is recommended to avoid the southern headland because of the reefs surrounding Sentinela and Cono islands.

* The French chart No. 1708 shows a detached sunken reef at about one-sixth of a mile north-eastward of Sentinela island. Although this reef does not appear in the English (Admiralty) chart No. 1929, it may possibly exist, and should therefore be carefully guarded against.

† Named Trucha in Sir Edward Belcher's R.N. chart, No. 1929

Leaving Bahia Honda.—The most convenient time for leaving Bahia Honda is during the morning, because then advantage can be taken of the East and N.E. winds. If these winds are weak it may be necessary to haul the vessel out by the boats.

Monita and Rosario Bays.—The coast from Bahia Honda northward a distance of 10 miles, is very irregular and forms several bays, of which those named Monita, Rosario and Pajaro are the principal. The first mentioned bay is immediately northward of point Ventana, 2 miles from Medidor island; it has an islet covered with trees in its northern part close to the shore, and affords good anchorage and shelter only with winds from the land, being exposed to all others. North of Monita bay is Rosario bay, which will be easily recognised by an islet near its middle, at about a mile from the shore, named Muela à Caballo; this bay is bounded on the north by point Muerto and on the south by point Gorda, between which is a projecting point dividing the bay into two parts, the southern of which takes the name of Pivay,—in each of these little bays is a river. As Rosario bay is exposed to westward, the anchorage is safe only with winds from the land. Pajaro bay immediately northward of that of Rosario, has a depth of 16½ fathoms, and is also unsafe with winds from westward. All this coast is free from danger at a moderate distance off.

The shore from Pajaro bay northward for a distance of 9 miles is fronted by a bank of 6 to 18 feet which extends out about 2 miles. The edge of this bank being very steep renders the utmost caution necessary in approaching; at night a depth of 22 to 18 fathoms will be quite near enough;—usually, the sea breaks heavily upon it. At the south end of this bank is the river Lavenia, and at the north end the river Tavasera; the latter is not barred.

PUEBLO NUEVO.—At about 8½ miles northward of the river Tavasera is point Cayado, the south side of entrance to the river of Pueblo Nuevo. The entrance to this river may be at once recognised by the peculiar formation of the hills between it and Tavasera river, which are 800 to 400 feet high, and appear as two islets from a distance. A hill 550 feet high, and having the form of a sugar-loaf, situated close to the shore on the north side of the river, is also a good landmark. In front of the entrance, almost due West from it, are two islets named Silva and Silva de Afuera, of which the latter is the westernmost; these are also good marks for the river.

In the entrance to the river are two large marshy islands formed of the soil brought down by floods; these are named Espartal and Porcada,—the latter is the southernmost. The channel between the islands is too shallow, and too much obstructed by shoals to be navigated except at high tide, and then only by boats, the entrance to the river is consequently south of the islands between them and point Cayado, and is about ¼ of a mile wide; the channel north of the islands is also unnavigable. The depth in the principal channel, in 1854, was 6 to 8 fathoms at low tide, and it was then sheltered on the north side by the Belitre bank, partially dry when the tide was out, extending westward from the south end of Porcada. Immediately within or eastward of this bank is a rocky islet named Perdoneo.

The best time to enter the river of Pueblo Nuevo is during the flood and with the wind from seaward. Special care is required on account of the shoal extending seaward from Porcada islet, the limits of which are indicated by breakers while there is any sea. Having entered, steer for Perdoneo islet and pass it on its south side; the depth hereabout will be 4½ fathoms, deepening

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to 6½ and 7 fathoms, fine sand. The anchorage selected by the French surveying vessel *Obligado* in 1854, was immediately southward of Perdono islet, with that islet in one with the south end of Porcada island bearing N. 28° E.; north point of Silva island N. 75° W.; north point of Silva de Afuera S. 88° W.; and point Cayado S. 88° W.

Perdono islet is steep and safe to approach; it may be rounded (1854), but there will be little occasion to go north of it, the channel south of it being wide and the main body of the river. In the event of going north of it, keep close to it on account of the shoal from Porcada island. The depth eastward of the south point of Porcada island is very irregular, and frequently does not exceed 3½ fathoms; hence it is not a convenient anchorage for large vessels, but for small vessels drawing less than 16 feet it offers the advantage of being well shut in and protected from almost all winds. According to the inhabitants, westerly winds frequent from June to October, occasionally send into the river a very heavy sea, which causes considerable inconvenience to vessels anchored near Perdono island; at such times it will be advisable to run further into the river, and obtain shelter under the south-east side of Porcada,—the best passage is westward of Conejo, an island situated about a mile from Perdono.

The village of Pueblo Nuevo is at some distance within the river, and such is the difficulty of the navigation that it is necessary to be guided to it by a native. Here, although it is but a small place, almost all kinds of provisions can be obtained in considerable quantities.*

The best time to leave the river is when the land wind is blowing and a little before the end of the flood. Steer so as to give point Cayado a berth of about a cable's length, and pass southward of the islands Silva and Silva de Afuera, after which such a course may be run as may be convenient. If necessary, a vessel may run between the two Silvas, but the channel eastward of the easternmost islet is safe only for those that draw 10 to 15 feet; there is an isolated rock off the north-west side of Porcada, at ¼ of a mile from shore, which renders extra care necessary. The north end of Silva island has a shoal extending from it nearly a mile.

It is high water full and change at 8h. 44m. The tide apparently rises 8 to 9 feet.

The foregoing description of the river of Pueblo Nuevo is based chiefly upon the observations of the French surveying vessel *Obligado* in 1854. According to the chart of Sir Edward Belcher, R.N., 1859, a spit of 2½ fathoms runs off about a cable's length from the west side of point Cayado, and on the south side of the point are some rocks close to the shore, named Nueces, which are above water. The shoal extending northward from Silva island has not more than 10 feet on its extremity, and as it nearly joins the sandy spit jutting out from the north end of Porcada island, the channel north of the island cannot be considered safe. The soundings between the Silva islands are 9 to 12 fathoms, the latter being near Silva de Afuera. Sir Edward Belcher says, "the port consists of the outlet of a large river, which takes its name from a small village of huts, situated on the river Santiago, at some distance from the entrance. It is formed by a neck or island about 8 miles in length, which affords good anchorage for vessels of any class. Three larger streams discharge

* It is said that the serpents in the various islands of the river, and also in the marshy land immediately bordering it, are of a venomous character.

themselves into the main basin at the western end of this island, where the apparent great entrance is situated; but so studded with rocks and shoals, as to be unnavigable for anything larger than boats. It is in fact, an extensive archipelago, as most of the regions towards the Chiriqui territory will be found to be on future examination.

Water cannot be procured in any quantity, although it may probably be procured by digging wells. The principal article of trade was sarsaparilla, that of this neighbourhood being esteemed of superior quality. The stream runs fresh at some miles up, but we did not either meet it, or succeed in finding the town. Sugar-cane, of good quality, was offered; and tortoise-shell, one of the articles of trade, can be procured at the season."

From the river of Pueblo Nuevo the coast takes a sudden turn in a westerly direction,—and at the distance of 28 miles is point Juco or Ojo the east side of David bay. Nearly all this shore is low and fronted by a sandy strand. In the interior, at about 12 miles from the sea, is a chain of mountains of considerable altitude, one of the peaks, in lat. $8^{\circ} 28'$, long. $82^{\circ} 03'$, being 8140 feet high; the country at the foot of these mountains consists in general of a well wooded plain. The entrances of the various rivers can usually be easily recognised by the white trunks of the mangrove trees, only the tops of which are in leaf; these rivers are barred, and the approach to them is known better by the nature of the bottom than by the depth, it being sandy in their immediate vicinity and muddy outside. Along all this coast as far as David bay there are no known sunken dangers, and vessels may run along it at the distance of 2 or 8 miles in soundings of 11 to 9½ fathoms. At about 18 miles from Pueblo Nuevo is the commencement of some cliffs of a red colour, which are very conspicuous; these continue some distance, and then the coast turns sharply southward and forms point Juco, the east side of David bay. On the east side of point Juco are some islands named Benado, which are a good mark for the bay to vessels approaching from eastward.

San Lorenzo Bay.—The bend of the coast just mentioned, terminating in point Juco, forms a bay named San Lorenzo, from a river of that name which falls into it. It is so thickly strewn with rocks that all vessels should avoid entering it, nor from the same cause can the river be approached except in boats. There is rather a considerable village on this river at a few miles from the sea.

DAVID BAY is included between Juco point and a large island named Prida, 11½ miles south-westward from the point. In it are numerous islands and rocks, but with the assistance of the Admiralty chart No. 2816, little difficulty will be experienced in selecting an anchorage. At about a mile south-westward from the point are two islets connected together and surrounded by a reef, named Monitas, the southern of which bears a close resemblance to a saddle; and, at 2½ miles S. ½ W. from these islands is an isolated rock named Viuda, having a reef extending from it about ½ a mile in an E. by S. ½ S. direction,—as this rock and reef are both steep, with soundings immediately around them of 10 to 12 fathoms, they require great care to avoid. It is said that to vessels approaching David bay from southward the presence of the Viuda reef may generally be known by breakers, but whether this be the case or not, it is a very formidable danger.*

* A sunken rock, the existence of which there is great reason to doubt, has been reported at about 4 miles S.S.E. from the Viuda. The French surveying vessel *Obligado* sought

In nearly the middle of David bay is a very dangerous rock named *El Buey* which is only visible at half tide, and for which unfortunately no well defined landmarks can be given. Its position is 8 miles W. by N. from the southernmost Monitas islet, and $1\frac{1}{2}$ miles N.E. $\frac{1}{2}$ E. from the largest San José islet. Its extent is but small, and the soundings close to it are 5 to 7 fathoms.

David bay is so named from the river which falls into it, upon which is situated at the distance of $8\frac{1}{2}$ leagues in the interior the principal city of the province of Chiriqui in the state of Panama; the city bears the names of David or David Chiriqui, and is in lat. $8^{\circ} 27'$, long. $82^{\circ} 26'$; it can only be reached by boats, through a very intricate navigation.* At a short distance to the westward is the boundary between the Granadian Confederation and the Republic of Costa Rica.

The channel between the Monitas islands and point Juco is not considered safe, although the depth is 7 to 8 fathoms; hence vessels seeking the anchorage in David bay almost invariably pass southward of these islands, between them and the Viuda rock, or between the latter and the islets off the east side of Parida island. The mark to steer for is the San José islands, a small group of islands 4 miles westward of the Monitas; as these are covered with trees, and at low water the little sandy channels which separate them become dry, they are easily recognised. Vessels may approach the San José islands to a moderate distance, if ordinary precaution be taken to avoid any undiscovered outlying danger there may be about; having made the islands, bear up a little northerly and anchor, or anchor about midway between the islands and the Monitas. The only known sunken reef in the bay is the Buey rock already mentioned, for which a good lookout must be maintained.

The Buey rock being an isolated danger at a considerable distance from the shore, can be passed on all sides. If a vessel be so far in the bay that it is most convenient to pass it on the *west* side, she should give the San José islands a berth of about $\frac{1}{2}$ a mile, and steer with them bearing South to S. by W., until the bottom changes from mud to gravel, when the vessel will be inside the rock. If, on the contrary, the intention be to go *eastward* of the rock, pass the Monitas on the south side, and steer for Carré island, situated $1\frac{1}{2}$ miles W.N.W. from Juco point, and afterwards continue along the south side of the chain of islets as far as the entrance to Boca Chica, off which there is anchorage in $4\frac{1}{2}$ to 5 fathoms. In 1854 the French surveying vessel *Obligado* anchored here in 4 fathoms, with Viuda rock bearing S. 84° E.; the

for it unsuccessfully, although assisted in the search by a native of the country who stated that he had seen the breakers upon it. The difficulty of finding an isolated sunken rock in deep water is well known; hence, it will be prudent to exercise more than ordinary vigilance when in the vicinity of this reported danger.

* The city of David had in 1854 a population of about 5000. Its distance from the sea is about 10 miles, but the Boca San Pedro, the mouth of the river David nearest to it, has a bar across it which we believe so shallow as to be impassable; hence vessels are obliged to resort to the Boca Chica 16 miles eastward of it, making a total distance of 26 miles from the city. Around the city are cultivated lands which reach to the foot of the extinct volcano of Chiriqui. There is but little commerce, and that chiefly with Panama.

From the summit of the volcano of Chiriqui the waters of the Atlantic and Pacific can be perceived, and it has been proposed to construct a railway across the level country between the two oceans. It is said that there are no obstacles to the construction of such a means of communication greater than an engineer of average ability would be able to overcome with ease. The proposed route was from Almirante bay on the north side of the isthmus, to David bay on the south side, taking the city of David on the way; hence vessels would have a sheltered anchorage at each terminus. A bed of coal of considerable value traverses the whole distance.

southern Monita S. 59° E.; north-west point of San José S. 89° W.; and Lavandera rock N. 15° E. This anchorage is safe during the fine season, as it affords good shelter from the prevailing breezes, and especially from northerly winds which at that time have occasionally considerable strength; but during winter, when S.W. winds prevail, it is better to anchor further out under shelter of the San José islands.

The coast north of the chain of islands extending from Juco point to the entrance of Boca Chica forms a bay named Playa Grande, in the north-eastern part of which is an inlet known as Chuchegal bay. Playa Grande has not been closely examined, and is reported to have many sunken reefs in it; the soundings over its surface are probably 4 to 8 fathoms. The country behind Chuchegal bay affords abundant pasturage for cattle.

Boca Chica.—This is the narrow channel between Saino and Ventana islands, $8\frac{1}{2}$ miles W.N.W. from Juco point, and is the only entrance to the river David practicable for vessels, which must be of very light draught, there being at low tide only 8 to 10 feet water in some parts of it. Boca Chica may be recognised by the rocks of Ventana island, which have been pierced by the sea. On the east side of the entrance is a rock named Lavandera, an isolated danger visible except near high water, situated about $1\frac{1}{2}$ cables' length southward from Saino island, and which must be carefully guarded against, there being a depth of 4 and 5 fathoms close to its south side.

At the village of Boca Chica, on the north side of the river and $3\frac{1}{2}$ miles from the sea, the usual articles of provision can be procured, such as poultry, eggs, fruits, vegetables, &c. Meat cannot be obtained in any quantity, but cattle can be bought without difficulty. Fresh water of excellent quality can be got from the stream immediately east of the village.

It is high water on the days of full and change of the moon at Boca Chica at 8h. 15m. The rise of tide is about $10\frac{1}{2}$ feet. During the *Obligado's* visit, the flood at the anchorage outside the entrance was observed to flow N.N.W., and the ebb the contrary, with an average strength of 1 mile per hour; which diminished in force towards the San José and Monitas islands. Within the entrance and in the river, the current was much more violent.

When leaving David bay, if obliged to go westward of the San José islands it is recommended to approach nearer those islands than to Palenque because of the rocks extending from the latter; the depth in the channel between is 6 and 7 fathoms. In the French chart No. 2816 a sunken rock of $11\frac{1}{2}$ feet is inserted at about $\frac{1}{2}$ a mile westward of the south part of the San José islands. Having cleared this sunken rock, a wide berth should be given to some rocks situated $1\frac{1}{2}$ miles almost due South from the San José islands; the depth throughout will be 8 and 9 fathoms.

PARIDA ISLAND.—This is an island of irregular shape $8\frac{1}{2}$ miles long in a N.N.E. and S.S.W. direction, and about $1\frac{1}{2}$ miles wide in its broadest part. It is well wooded and there are rivulets affording abundance of water. Numerous islands having among them many sunken reefs, are scattered about on its east and south-east sides to the distance from it of 8 to 4 miles, the largest (and almost furthest to seaward) of which is named Bolano; these islets and reefs make the approach to David bay from south-westward a proceeding of some little risk. Among the islets and reefs there are doubtless channels which might be navigated in boats, but vessels must be kept outside them, as they have not been closely examined.

The only commodious anchorage in Parida island is at its north-east end, under protection of an island which affords shelter from southward; the depth

is $6\frac{1}{2}$ fathoms on mud, and there is a little sandy bay where a landing can be effected. If from David bay, vessels may pass either on the west or south sides of San José islands; if the former, it is necessary in the boards to westward to tack immediately the depth becomes $4\frac{1}{2}$ fathoms. If this anchorage be approached from seaward, steer for the Viuda rock, and, passing it at the distance of about $1\frac{1}{2}$ miles on its west side, direct your course for the San José islands; leave these islands to the northward, and then steer for the north end of Parida island, maintaining a depth of 7 to 6 fathoms, but decreasing to $3\frac{1}{2}$ fathoms as the anchorage is approached;—when it deepens again to $6\frac{1}{2}$ fathoms, anchor. The lead should be kept going, and a good look-out kept for any undiscovered sunken rocks. At this end of Parida plenty of good water may be obtained.

Chimmo Bay.—At the south-west end of Parida island is a little bay named Chimmo, where is a depth of 10 to $2\frac{1}{2}$ fathoms; good water may be obtained from here. In front of the bay is a little islet known by the name of Santa Cruz; the passage in is north of this islet, because some rocks extend from it southward to the shore. A reef also runs off southward a short distance from some islets on the north side of the bay.

When sailing round the south-west point of Parida island, it should have a berth of about a mile, on account of some sunken rocks $\frac{1}{2}$ a mile from it, which have a depth of 15 and 16 fathoms close to them.

From Parida island northward to the archipelago of islets fronting the coast, there is, with the exception of a narrow channel of 8 to $8\frac{1}{2}$ fathoms close round the north end of the island, a bed of rocks through which they may be channels fit for boats. The sea usually breaks upon these reefs when there is any wind.

Point Burrica.—From the south end of Parida island to the extremity of point Burrica, the bearing and distance are W. by S. $\frac{1}{2}$ S., 84 miles. The coast between forms a large bay which recesses 20 miles from a supposed line connecting these points. The shore in the east part of the bay, consists of low islands forming the delta of the river David. The principal entrance to the river, the Boca San Pedro, is between Sevilla and San Pedro islands, and as already noticed is impracticable for vessels. Sevilla is the easternmost island; it abounds with game of various kinds, which can be obtained with facility. San Pedro is the westernmost of the large islands of the river; from this island the coast trends westward and southward to point Burrica, and along the northern shore are met with in succession the rivers Piedra, Pinos and Bartolomé. In all this bay there is no sheltered roadstead, nor does it possess any advantage which should make it a place of resort for vessels.

COIBA ISLAND.—This is the largest island off the coast between Mariato and Burrica points, as it is 19 miles long in a N.W. by N. and S.E. by S. direction, and about 12 miles wide in its broadest part. It is covered with forests, and there is abundance of good water in every part. Vessels may anchor off it on all sides during fine weather, but unfortunately it possesses no bay nor harbour in which shelter may be obtained from all winds. As it is at present (1854) uninhabited, it is seldom visited. It was surveyed in 1848 by Lieut. Wood, R.N., and a chart (No. 1928) of it was subsequently published by the Admiralty. To this chart we must refer the reader, for the various details of its coast and outlying reefs.

The western coast of Coiba island appears, from the survey, to be of moderate height, and bold, and there are no known dangers outside those abutting on the

shore. At about half way down there is an open bay, named Hermosa, in which is a depth of 20 to 14 fathoms.

The eastern coast of the island forms a Damas bay, 5 or 6 miles in extent, which affords a good depth of water and excellent shelter from westward. The soundings are from 80 to 15 fathoms, shoaling to the shore; and water may be obtained in the northern part of the bay. Off the southern shore rocky shoals extend nearly a mile out, so that some care is required to avoid them. In the middle of the bay the land is low, and here there is a small stream, named San Juan, at the entrance to which are some sandy flats.

The navigator Colnett anchored in Damas bay in 1794, and considered it to be the most commodious place for cruizers he had met with in these seas, as it abounded with wood and water; also trees of the cedar kind, large enough to make masts for first-rate ships, and of excellent quality; his place of anchorage was in 19 fathoms, with the watering place bearing about N.W. $\frac{1}{2}$ N., and the south point of Coiba S.E. by S.; but he stated that vessels might lie near enough to the shore to be able to haul off their water; the time of anchoring must however be considered, for sandy flats run a long way off, and may deceive in distance. At the period of his visit the flood came from northward, flowing seven hours and ebbing five, and the perpendicular rise of the tide was 2 fathoms. "The anchorages throughout the bay are good; and 5 or 6 miles off you will find 93 and 95 fathoms, good holding muddy ground. Few vegetables or fruits are to be obtained here, but shell-fish, as crabs, cockles, periwinkles, and oysters, may be had in plenty; there are also other fish to be caught, but alligators, sharks, and sea-snakes swarm on the adjacent shores, and seem to harass, destroy, and lessen the quantity; deer and other animals are said to inhabit the island, and birds and monkeys are numerous, but they are very shy, and difficult to get at, owing to the state of agitation they live in, from the wolves, tigers, hawks, and vultures that prey upon them. Turtles also are in great abundance, yet hard to catch. Whales also frequent these shores, but not in any great numbers; some of these are of the spermaceti species."

In the account of Lord Anson's voyage, by Richard Walter, published in 1776, there is a description of Coiba island, in the following terms. It should be premised that the anchoring place was in Damas bay.

"The island of Coiba is extremely convenient for wooding and watering, since the trees grow close to the high-water mark, and a large rapid stream of fresh water runs over the sandy beach into the sea: so that we were little more than two days in laying in all the wood and water we wanted. The whole island is of a very moderate height, excepting one part. It consists of a continued wood spread all over the whole surface of the country, which preserves its verdure the year round. Amongst the other wood, we found there abundance of cassia, and a few lime-trees. It appeared singular to us, that, considering the climate and the shelter, we should see no other birds than parrots, paroquets, and mackaws; indeed, of these last there were prodigious flights. Next to these birds, the animals we found in most plenty, were monkeys and iguanas, and these we frequently killed for food; for, notwithstanding there were many herds of deer upon the place, the difficulty of penetrating the woods prevented our coming near them; so that, though we saw them often, we killed only two during our stay. Our prisoners assured us that this island abounded with tigers; and we did once discover the print of a tiger's paw upon the beach, but the tigers themselves we never

saw. The Spaniards, too, informed us, that there was frequently found in the woods a most mischievous serpent, called the flying snake, which, they said, darted itself from the boughs of trees, on either man or beast that came within its reach; and whose sting they believed to be inevitable death. Besides these dangerous land animals, the sea hereabouts is infested with great numbers of alligators, of an extraordinary size: and we often observed a large kind of flat-fish, jumping a considerable height out of the water, which we supposed to be the fish that is said frequently to destroy the pearl divers, by clasping them in its fins as they rise from the bottom; and we were told that the divers, for their security, are now always armed with a sharp knife, which, when they are entangled, they stick into the belly of the fish, and thereby disengage themselves from its embraces.

Whilst the ship continued here at anchor, the Commodore, attended by some of his officers, went in a boat to examine a bay which lay to the northward; and they afterwards ranged all along the eastern side of the island; and in the places where they put on shore, in the course of this expedition, they generally found the soil to be extremely rich, and met with great plenty of excellent water. In particular, near the north-east point of the island, they discovered a natural cascade, which surpassed, as they conceived, everything of this kind which human art or industry hath hitherto produced. It was a river of transparent water, about forty yards wide, which rolled down a declivity of near 150 in length. The channel it fell in was very irregular, for it was entirely composed of rock, both its sides and bottom being made up of large detached blocks; and, by these, the course of the water was frequently interrupted: for in some parts it ran sloping with a rapid but uniform motion, while in others it tumbled over the ledges of rocks with a perpendicular descent. All the neighbourhood of this stream was a fine wood, and even the huge masses of rock which overhung the water, and which, by their various projections, formed the inequalities of the channel, were covered with lofty forest trees."

Rear-Admiral Sir George Seymour has remarked of Coiba island, "It is about the same size as the Isle of Wight. Off the points, ledges of rocks generally extend; but there is an appearance of an anchoring-place in the intervening bays on the east side, along which I proceeded in the *Sampson* steam-vessel. The soil on the coast is good, but the interior is nearly inaccessible from the steepness of the cliffs and the tangled vegetation. We found traces of pearl-divers having visited the shores; but there are no inhabitants (1847) except at the small islet of Rancheria, between which and the north-east end of Coiba there is good anchorage. A Frenchman, of the name of Sorget, is resident on Rancheria; and this situation, as far as I could judge on a cursory view, seems more favourable for an establishment than any we saw on the larger island."

Hicarons.—Southward of Coiba are the Hicarons, two small islands, the southernmost of which is in lat. $7^{\circ} 6'$, long. $81^{\circ} 46'$; the larger island is $8\frac{1}{2}$ miles long, and the smaller 1 mile; they lie north and south of each other, being separated by a narrow channel. The small island is entirely covered with cocoa-trees; and the large one bears an equal appearance of leafy verdure, but there are very few trees of the cocoa kind. Hicaron is 880 feet high, and the most extensive look-out, says Captain Colnett, is from the top of this island, for it commands Coiba and the whole of the coast and bay to the northward.

The channel between Hicaron and Coiba is about 4 miles wide, and has an irregular depth of 6 to 10 fathoms. It is clear of sunken rocks; but as there are some dangers near the south-east point of Coiba, it will be more prudent to pass southward of the islands than to attempt the passage within them. The principal danger to be avoided is the Hill rock, a small patch of 6 feet water, lying 2 miles S. $\frac{1}{2}$ E. from Barca island, a small islet close to the shore of Coiba, and 5 $\frac{1}{2}$ miles E. $\frac{3}{4}$ N. from David point, the eastern point of Hicaron island; close to this rock are soundings of 10 to 15 fathoms, so that it is very dangerous.

Rancheria &c.—Off the N.E. point of Coiba island are several islands and rocks. The largest island, named Rancheria, is 1 $\frac{1}{2}$ miles in length, and lies about 1 $\frac{1}{2}$ miles from the shore, from which it is separated by a channel of 7 and 8 fathoms, but, as there are several rocks in this passage, it will not be prudent to attempt to run through.* North-eastward of this, about 4 $\frac{1}{2}$ miles are two smaller islands, named Afuera and Afuerita, which are surrounded (for a very short distance) by rocks. A reef extends from the south-east point of Afuera, the larger island, about 2 cables' length; at its extremity is a black rock, almost covered at high tide.

Contreras.—This group is about 10 miles northward from Coiba, and is composed of two principal islands surrounded by many small islets and rocks. The northern island is named Brincanco, the southern Pajaros. Among them there is no good anchorage. The *Obligado* anchored north of Brincanco in 1844, opposite a little bay in which were anchored the boats of some pearl and turtle fishers, and found the bottom very bad for holding, although composed of gravel.

Vessels may approach the Contreras without hesitation if due precaution be taken, as it is believed that there are no sunken dangers among them the positions of which are not shown by breakers. The soundings immediately around them are 30, 35 and 40 fathoms, the latter being close to their south-west side, and there is a clear channel between the two large islands in which the depth is 33, 21 and 34 fathoms. At about 2 miles south from the islands is the Prosper rock, a pinnacle having the appearance of a black tower; although this rock is steep on all sides, it will be prudent not to attempt to pass between it and the islands on account of a reef partially dry at low tide situated about midway in the channel.

Secas.—This group of islets and rocks is situated nearly 15 miles from the coast between Pueblo Nuevo and David bay. About and among them are no known sunken rocks, the positions of which are not usually indicated by breakers. Here there is good shelter for small vessels, and upon some of the islands a landing may be effected, but there is very little inducement to go ashore as no water can be obtained. If the approach of night or failure of wind oblige a vessel in their vicinity to anchor, the best anchorage is in 10 to 12 fathoms on sand.

At about 8 miles eastward from the Secas is a dangerous rock named Bruja, which is almost awash at low tide. The position of this reef makes it a very formidable danger, especially at night; there are soundings of 20 to 24 fathoms close around it.

* There is good anchorage S.S.E. of Rancheria, opposite a sandy beach, whence wood and water can be easily procured from the island. Some shelter is furnished by a high round island.

Montuosa.—This little island is situated about 22 miles westward from Coiba island, its position being considered to be lat. $7^{\circ} 28'$, long. $82^{\circ} 19'$. It rises to a considerable height, and has its summit covered with cocoa and other trees. A narrow reef above and under water, extends from it about 8 miles in a north-westerly direction, and a reef also runs off from its south-east side. Captain Colnett landed here in 1794. He mentions that the bottom on the south side of the island, and also the shore near the sea is rocky. A sandy beach was found behind some little creeks between the rocks which afforded a safe landing for boats.

Ladrones.—These are two islands situated about 15 miles southward of Parida island, their position being about lat. $7^{\circ} 52'$, long. $82^{\circ} 25'$. They are barren, of moderate height, and together are not more than a mile in extent. They may be approached with safety, if precaution be taken to avoid any sunken rocks there may be in their vicinity. The only known dangers are some rocks nearly a mile northward of them, and a reef about 4 miles from them in the same direction, upon which at low tide is a depth of only 6 feet; as the position of this latter is only shown by breakers when there is a stiff breeze, it is a reef that must be very carefully guarded against.

GULF OF DULCE.—Point Burrica, the extremity of the land on the south-east side of the gulf of Dulce, appears like an island at a distance, and may be readily recognised, whether seen from south-westward or south-eastward. It advances seaward considerably from the main land, and its summit rises into three hills of apparently equal height and distance from each other. A nearer approach brings into view the low point which terminates it; this also resembles an island from a distance. At rather more than a mile from its extremity is a high isolated rock, serving as an excellent object for recognition when making the land from seaward; in the channel between, and also around this rock are breakers, upon which account it will be prudent for vessels to give it a wide berth. Point Burrica is sufficiently lofty to be seen in clear weather from a distance of about 35 miles; in its vicinity the flood tide sets N.W. with some strength, hence it is recommended to avoid being becalmed on its south-east side.

From point Burrica the coast trends about 25 miles in a N.W. direction to point Platanal at the entrance to the gulf of Dulce. It is bold throughout, especially at point Platanal, where the mountain immediately over it rises to the height of 2330 feet, and faces the sea in an almost perpendicular cliff. This mountain is succeeded in a northerly direction by a moderately flat country, not visible from a distance, hence the cause of the land between points Burrica and Platanal appearing like an island from seaward. It is said that in all this coast there is but one place where a landing can be effected, and that is in a little rocky creek at about 13 miles from point Burrica, into which a rivulet falls.

With a westerly wind it will be advisable to give the coast just described a wide berth. Although not absolutely unsafe, the sea in its vicinity is very deep and rocky. At 2 miles from the land the lead fails to touch the bottom, sounding 80 fathoms, and with a strong wind from south-westward breakers of extreme violence are to be met with inshore. For these reasons, vessels bound into the gulf of Dulce are advised to bear away for cape Matapalo, the west side of the gulf, after making point Burrica; moreover within the cape is good anchorage and a more moderate depth of water.

The gulf of Dulce extends into the land about 40 miles in a north-westerly

direction, with an average width of 14 to 10 miles. It is but little frequented, and until 1852 was almost unknown to Europeans; at that time its population consisted only of 12 to 15 families located at point Arenitas, on the west side of the gulf. Its soil is extremely fertile, and it is asserted that its navigation is by no means difficult. It possesses numerous excellent anchorages, and there are no known sunken dangers at a greater distance from the land than a mile, with the exception of the bank facing the river Coto, on the east shore, at about 15 miles within the entrance; this is the principal danger in the gulf, but as the sea almost always breaks upon it, and its position is well indicated by the soundings in its vicinity, there is but little difficulty in avoiding it.

Cape Matapalo, on the west side of the entrance to the gulf of Dulce, is high, precipitous and covered with trees; where the trees have fallen on the steep slopes the soil has a reddish appearance. This cape is the south-eastern termination of the high land *Sal-si-puedes*, which can be seen from a considerable distance; hence, with the high land terminating at point Burrica, the situation of the gulf of Dulce is well marked. At about a mile from the cape in an E.S.E. direction there is a rock 10 to 12 feet high, known as Matapalo rock, which stands out prominently from the coast, and when viewed from south-westward or north-eastward, appears very conspicuously; it is safe to approach, but as there are breakers between it and the land, vessels should always pass it on its south side. The coast on the opposite side of the gulf is believed to be clear of all outlying dangers, but what are visible.

All the western shore of the gulf consists of a flat well wooded country, sandy to the village of Arenitas, and afterwards alluvial. At about 6 miles northward from Matapalo rock is point Sombrero, from which a reef extends about $\frac{1}{4}$ a mile; and 8 miles further in the same direction is Tigrito point, also having a reef from it to the distance of $\frac{1}{4}$ of a mile;—these reefs are the only known dangers on the western side of the gulf which vessels have to fear in the approach to Arenitas from southward.

Point Arenitas.—At about 9 miles from Tigrito point is point Arenitas, a low sandy projection of the coast, which in 1852 was for the greater part covered with trees. The houses on its extremity are visible only from a moderate distance. At about a cables' length eastward from the point is a coral bank, which partially dries at low tide; it has an extent of only 2 cables' lengths from East to West, and as its eastern edge is so steep that soundings of 14 to 12 fathoms may be obtained close to it, more than ordinary care is required when approaching the point. Small vessels may pass between this bank and the shore, the narrow channel having a depth in it of 16 to 18 feet; it is necessary to use the lead.

When approaching point Arenitas from cape Matapalo, the sea is too deep for anchorage until point Tigrito is approached, the average soundings being 35 to 30 fathoms. Off this point (Tigrito) is anchorage in 13 to 16 fathoms, sand and shells; or further out in about 20 fathoms, green mud. At Arenitas point there is anchorage either N.W. or S.E. of the village; the latter is preferable if it be intended to remain only a short time, on account of its exposure to the sea breeze and the consequent freedom from the excessive heat felt northward of the point. The best position for anchoring south-eastward of the point is, at about a mile from the land in 10 to 12 fathoms, green mud, with the flagstaff (1852) bearing W. by N. $\frac{1}{4}$ N., and point Tigrito S. $\frac{1}{4}$ E.

The anchorage north-westward of the point is very good, and convenient for effecting general repairs; but, if it be necessary to heel the vessel over, the Golfito, on the eastern side of the gulf, will be found a far more suitable place. The depth is 16 fathoms at $\frac{1}{2}$ to $\frac{1}{4}$ a mile from the land, on green mud; eastward and northward of this position the soundings are 83 to 55 fathoms.

The landing place at point Arenitas is on its north side, at the entrance to a little creek which is dry at low water. The point is almost as steep as a quay. No water can be obtained here to supply a vessel, but sufficient may be got from the river Tigre, 5 miles north-westward from it; when off this river it is advisable to send ashore at half-flood, that the stream may be ascended as far as possible, and it is recommended to leave the river at half-ebb, because the sea falls rapidly. It is high water at the village of point Arenitas on the days of full and change of the moon at 8h. 15m.; the highest rise of tide observed was 12 feet.

When the *Brillante* was at point Arenitas in 1852, a small quantity of fresh provisions was obtained from the village. Cattle could only be procured from the hacienda of Tigre. The neighbouring forrests were ascertained to be rich in spars, and timber suitable for building purposes. Fish was abundant.

Point Tigre.—From Arenitas to point Tigre the distance, as before observed, is 5 miles in a north-westerly direction; the coast between, covered with mangroves, is so steep that at about $\frac{1}{4}$ of a mile from it the depth is 15 to 30 fathoms, on sand. This point is formed by a mud bank, dry at low water, which extends out about $\frac{1}{2}$ a mile. It is on the north side of the point that the little river Tigre, already alluded to, falls into the sea. In 1852 there were two entrances to the river, neither having much depth nor breadth, but the northern had the most water.

From point Tigre to El Rincon, the head of the gulf, the distance is 17 miles, along a shore destitute of any objects sufficiently remarkable to be mentioned. At 5 miles from the point is the little river Aguja, which has or had a hut at its entrance; and 9 miles from this is Palma point, a very slight projection of the land, recognised by its two cocoa-trees, which are the only trees of the kind on all the coast from point Arenitas. The river Rincon is $8\frac{1}{2}$ miles from Palma point; it has two entrances which can only be entered by boats.

The soundings between the rivers Tigre and Aguja are not so deep as those southward of Tigre point; but they increase in depth as Palma point is approached, and also towards El Rincon, the head of the gulf.

At El Rincon the coast suddenly turns N.E. by E. $\frac{1}{4}$ E. and trends in that direction 11 miles, when it changes to E.S.E. and maintains that line of bearing throughout almost the whole of the east side of the gulf. In a very considerable part of this coast the mountains rise almost from the sea, and are covered with impenetrable forests; this description of coast prevails so far as the Golfito, when the mountains recede from the shore, and are succeeded by an almost flat country. At the head of the gulf, at not more than $\frac{1}{4}$ a mile from the north shore, are some islets, surrounded by coral banks.

River Esquinas.—Following the coast round the north-east side of the gulf, we meet, at 4 miles from the islets just mentioned, the small river Esquinas, which falls into the sea through a marshy plain. Fronting it is a bank of mud and sand, soil brought down in rainy seasons, which extends from the shore about $1\frac{1}{2}$ miles and is for the most part dry at low tide. A channel into the river has been reported as existing across this bank, but at the period of the

examination of the gulf (in 1852) by the officers of the French ship *Brillante*, the bank was dry over the whole of its extent; there may therefore be a channel only during floods in the interior.

From the river Esquinas the coast trends $4\frac{1}{2}$ miles south-eastward to point Esquinas and is bold all the way, and the soundings met with in succession are 8 to 10 and 16 fathoms at a very short distance off it, the latter being close to the point. From this headland to point San José the distance is $9\frac{1}{2}$ miles in an E. by S. $\frac{1}{2}$ S. direction, passing at about midway a bold projection of the land; around point San José are rocks, off which is a pearl fishery at the depth of $6\frac{1}{2}$ to 10 fathoms. From this point to the entrance of the Golfito the distance is about 4 miles.

When running down the coast from the islets to the Golfito, it is advisable to give the shore a good berth, as it has not been very closely examined. The soundings close to the land are represented as deep, which the mountainous nature of the country in its immediate vicinity would lead one to infer.

Golfito.—This is an inlet of irregular shape running into the coast about $8\frac{1}{2}$ miles, the upper or south-eastern part of which is very shallow. The entrance is well defined on the north side by point Golfito, a high bold promontory having a depth of 6 fathoms close off it, and on the south side by a hill 790 feet high having at its base a low sandy peninsula; the latter is very narrow, and has or had a few cocoa trees upon it. The entrance is about $\frac{1}{2}$ of a mile wide, and is in the direction of N.E. by N.; at first the depth is 18 to 7 fathoms, being shallowest off the southern shore, and thence it gradually decreases to $4\frac{1}{2}$ fathoms as the extremity of the sandy peninsula is approached. Immediately within this sandy spit, on its south side, the soundings are $4\frac{1}{2}$ to 2 fathoms, and vessels may enter, if care be taken to use the lead frequently to avoid any shallow spot that may have escaped the detection of the surveyors. If unfortunately it be necessary to heel the vessel over for repair, it may be done in the Golfito, as there are many places suitable for that purpose. Squalls and heavy rains are very prevalent here.

The regular winds of the gulf make the navigation of the channel leading into the Golfito comparatively easy, and with the land wind vessels can leave it without difficulty. There is anchorage in mid-channel in about $4\frac{1}{2}$ fathoms. If desirous to anchor eastward of the peninsula, it will be advisable not to do so northward of the house on its extremity bearing W. by N. $\frac{1}{4}$ N.

River Coto.—From the Golfito the shore trends $7\frac{1}{2}$ miles S.E. by E. to the river Coto, and afterwards 15 miles south-eastward and westward to point Banco, the latter portion of coast forming the bay of Pavon; it is low and sandy throughout, and backed by a flat well timbered country. The river Coto is the most considerable stream that falls into the gulf. It is said to have two entrances, 5 to 6 feet deep with sufficient water therefore for the admission of boats, but fronting it is a bank, already alluded to, which renders approach to the river difficult; this bank extends from shore about 2 miles, and lines the coast northward as far as the entrance to the Golfito, its breadth gradually decreasing as it approaches the sandy peninsula into which it ultimately merges. The sea, even in calm weather, generally breaks on the bank; hence, although its outer edge is very steep, it can usually be avoided without difficulty.

In Pavon bay the soundings at a mile from the shore are 5 to 3 fathoms on sand. Vessels may anchor there, but only in very fine weather, and with the wind from eastward.

Point Banco is bold and steep, but not so lofty as point *Platanal* 6 miles south from it. It is well wooded, and at its base are some rocks too near the land to be dangerous except to vessels close in shore. At about a mile south from it is a little stream, named *Claro*. It is advisable to give the coast between points *Banco* and *Platanal* a good berth, as it is believed that rocks extend off it a short distance.

Point Sal-si-puedes.—From cape *Matapalo* the coast trends W.N.W. 16 miles, and then westward about 4 miles to point *Sal-si-puedes*; the actual bearing and distance of the two points of land from each other being W. by N. $\frac{1}{4}$ N. and E. by S. $\frac{1}{4}$ S., 20 miles. It is low and sandy all the way but immediately behind it is high land visible from a considerable distance. Except in very fine weather it is unadvisable to approach this coast closely, the sea off it being deep, and there being usually extremely heavy breakers upon the beach; in some parts there is no bottom, sounding 50 fathoms, at less than $\frac{1}{4}$ a mile from the shore. At times, after landing, a sudden breeze has sprung up bringing with it so heavy a sea, that many hours have elapsed before the unlucky boatmen could re-embark.

At about a mile southward from point *Sal-si-puedes* there is a round bare rock named *Choncha Pelona*. It is possible that there may be a clear passage between this rock and the shore, but as such has not been ascertained it will be advisable for vessels to keep outside it; it is believed that deep water exists at a very short distance from its south side.

Corcovado Rock.—Point *Sal-si-puedes* is high and precipitous, and when bearing E. $\frac{1}{4}$ N., with an offing of 5 miles, appears abrupt and cliffy. Hence to point *Llorena* the distance is $14\frac{1}{2}$ miles in a N.W. $\frac{1}{4}$ W. direction. At about midway between the headlands is the *Corcovado* rock, which is 88 feet high, and, viewed from a moderate offing, stands out very prominently from the coast; it is apparently joined to the shore by a sunken ledge, which is probably the seaward termination of a bank fronting the small river *Sirena*. It will be prudent when passing the *Corcovado* to give it a wide berth, as the locality has not been closely examined; at $1\frac{1}{2}$ miles south-westward from it the depth is 14 fathoms, and it is said that there is no bottom at 80 fathoms at a short distance southward from it.

When approaching the *Corcovado* rock from north-westward it is strongly recommended to avoid the coast between it and point *Llorena*, as it is suspected that there are sunken rocks or shoals off it; the bottom is known to be extremely irregular, and the low sandy coast presents no prominent marks to prevent a vessel getting too near. It is said that having rounded point *Llorena* and steering a course too much to the shore, the depth decreases suddenly and with great irregularity from 20 to 18 (?) fathoms; but if a direct course be steered from the point to the rock the average soundings will be 11 fathoms on fine sand, differing however $1\frac{1}{2}$ to $2\frac{1}{2}$ fathoms between the casts. As soon as the rock bears about East the depth rapidly increases in the track southward.

Point Llorena.—This is a high, steep, and almost perpendicular headland, well wooded, and partially covered with a luxuriant vegetation; it will be easily recognised by a fine cascade which falls from one of its cliffs. At a short distance from it are some islets some of which are well covered with shrubs.

From point *Llorena* the coast runs 6 miles in a northerly direction to point *San José*, a bold bluff headland, having it is believed, deep water at a moderate

distance from the rocks at its base ; this point may be recognised from a good offing by a spot on it bare of trees. At about midway is point San Pedro, a cliffy projection having rocks about it under water. At nearly $1\frac{1}{2}$ miles from this part of the coast is a little rocky islet, named San Pedro, which is covered with trees and has sunken rocks about it extending seaward a cable's length or more. As this little islet is probably joined to the shore by a rocky ledge, it will be prudent when running down the coast to keep westward of it, giving it at the same time a wide berth. The islet and reef shelter a little bay under point San Pedro, the situation of which could, in 1852, be further known by a rock with a single tree on it, and also by the huts of the native Indians.

The beach on the south-east side of point San José is bordered with cocoa and banana trees. Boats can land here under the rocks extending from the point.

Cano Island.—Off this part of the coast, at about 10 miles distance, is the island of Cano, which is about a mile in extent from E. by N. to W. by S., and $\frac{1}{2}$ a mile across. It is covered with trees, and the surface of the island is so level, that their summits present from a distance the appearance of almost a horizontal line. Its west extremity is surrounded by a reef under water, extending out, it is considered, about $\frac{1}{2}$ a mile ; upon account of which, and also because the current sets strongly upon it, vessels should give this end of the island a wide berth ;—so steep is this reef that close to its edge is a depth of 15 fathoms, and at a cable's length from it 33 fathoms. The north-east point of the island has also some rocks about it, above and under water.

The landing place on Cano island is on a sandy beach at its north-west side. In stormy weather, with a strong wind from westward, it will be imprudent to attempt to go on shore, as these winds always bring a heavy sea.

In the channel between the island and the shore there is no known danger. The depth midway is about 35 fathoms, which diminishes gradually eastward and westward ; it is perhaps less deep nearer the land than the island.

When steering from the island southward towards point Llorena the bottom becomes very irregular, as the soundings change suddenly from 27 to 32 fathoms ; but near the point it again becomes regular. Northward of a supposed line joining the island to point San José, the lead brings up a green compact sand ; southward of the line this sand is mixed with fine sand and broken shells.

River Aguja.—Following the shore from point San José about 3 miles, we meet with the little river Aguja which can be entered by boats. This is the only stream on the coast between the gulfs of Dulce and Nicoya, whence water can be obtained with facility.

Sierpe Bay.—From the river Aguja, a high wooded shore fronted by a narrow beach, trends northward 5 miles to Sierpe bay, where is a little river. The bay is surrounded by high land, and can be recognised from an offing of 8 miles by a large bare part called the *rastrado*. The soundings across the entrance to the bay are 16 to 18 fathoms, on green sand of considerable tenacity.

The north point of Sierpe bay, named Violine, is a bold and rugged projection of coast. Off it is an islet covered with trees ; around this islet is a sunken rocky ledge, which may possibly extend to the shore,—hence vessels should always pass this islet on its west side, giving it a wide berth.

Sacate Islet.—At about 2 miles from Violine islet in a N. by W. direction,

is a little islet named Sacate, which is distant nearly 8 miles from the nearest shore. It is believed to be surrounded by a rocky ledge.

Point Mala de los Indios.—From point Violine the coast bends sharply round eastward and forms the little bay of Violine, into the north side of which the rivers Guajumal and Matapalo fall. It then trends northward, or rather westward of North, 19 miles, and at the end of that distance suddenly turns to the westward to point Mala de los Indios. All this land is low, well wooded and in the interior marshy; it contains several rivers, at some distance inland is said to be a large lake of which these streams are the outlets. These rivers, in succession from the Matapalo, bear the names of Brava, Chica, and Coronada. The coast is believed to have no sunken dangers off it, and it is asserted that the soundings in its vicinity are regular, averaging 15 to 10 fathoms at 8 to 2 miles from shore; the bottom is, however, as might be expected, shallower in the immediate neighbourhood of the rivers.*

Point Mala de los Indios is bold and rugged; at a mile south-westward from it the depth is 16 fathoms. This point is the commencement of some high land, the Cerro de Ubita, which extends along the coast in a north-westerly direction; from this circumstance it is easily recognised, and especially too, as the land eastward and southward of it is low.

Point Ubita.—The coast from point Mala de los Indios trends 7 miles in a N.W. by W. $\frac{1}{2}$ W. direction to point Ubita, and is in general bold and cliffy. At rather more than 2 miles from point Mala de los Indios, a cluster of rocks above water, named Ballenita, will be recognised by their peculiar form, being slender in shape and pointed. Outside these, at a mile more to seaward, is a large rock, the Ballena, covered with guano; it is surrounded by a rocky ledge, which extends from it some little distance in a W.S.W. direction, and should consequently be approached with some care;—it is said that the sea always breaks upon this ledge.

Point Ubita has some rocks jutting off from it, and these are followed by a reef, under shelter of which, in what is called port Ubita, vessels of any size, it is said, may obtain shelter. Boats can land here without difficulty, and water may be procured from a river which here falls into the sea by two mouths, one eastward and the other westward of the point.

Point Dominical, distant $6\frac{1}{2}$ miles from point Ubita, is easily distinguished by its dark appearance, owing to the peculiar vegetation that covers it. The various projecting points between are well wooded, and there are several creeks of little importance, the chief of which bear the names of Dominical and Puerto Nuevo. At 2 miles eastward from point Dominical the depth is 20 fathoms, muddy bottom, and here vessels may anchor in fine weather, or nearer the shore, according as it may be convenient; the ground is good for holding.

Point Quepos.—Point Dominical is succeeded by a low sandy coast which trends 17 miles in a W. by N. $\frac{1}{2}$ N. direction to point Naranjos, a bluff projection, and this again is followed by a low coast for a distance of 4 miles to point Quepos. In this extent there are four rivers, named Dominical, Barra, Savagrè, and Naranjos, the last mentioned being on the east side of the point of that name; none of these can, we believe, be ascended for any

* It is probable that all the rivers on this part of the coast are in some way connected in the interior, as it is stated by the natives, that a canoe entering the river Sierpe, at point Violine, can rejoin the sea at point Mala de los Indios.

distance even by canoes. The river Savagré is the most important of the rivers, and its banks are the most visited by the Indians.

The coast between points Dominical and Naranjos is believed to be clear of sunken dangers. It is stated that vessels may run along it at the distance of 3 miles in a depth of 19 to 24 and 27 fathoms, green mud. A nearer approach than this should not be made, the coast having been only very imperfectly examined.

In the vicinity of Naranjos point is a group of islets, having sunken rocks about them; the largest and easternmost is of reddish colour. At a mile outside these islets the depth is 25 to 27 fathoms, mud.

Quepos point is of moderate height and covered with trees. On its west side are some rocks situated some distance from the land, under shelter of which boats may anchor. In the immediate neighbourhood of this point, between Naranjos point and it, are some islets of similar character and appearance to those described in the proceeding paragraph; the largest, Manuel Antonio, will be recognised by its form being that of a *trapezium*, and its highest part, having trees upon it, is cleft in a remarkable manner. This islet shelters a small sandy creek, which is occasionally a resort of turtle fishers. There is no passage between these islets and the land.

Point Mala.—From Quepos point to point Mala the coast runs in the direction of West about 24 miles, and is low and flat the whole distance. At about a mile from Quepos point is the little river Veija; 2 miles from this is that of Las Damas; and $5\frac{1}{2}$ miles further westward is the river Pirri. These rivers, with the exception of the Vieja, are easily recognised from a moderate offing; not any of them are of the slightest value to shipping. Upon the whole of this coast the surf beats with great violence, rendering a landing almost impossible with a strong southerly wind. The soundings at 2 miles from shore are 12 to 16 fathoms, fine sand, which increase as point Mala is approached, and the sand becomes mixed with mud.

Point Mala is very low, and covered with trees and mangroves. A reef extends from it in a southerly direction about $1\frac{1}{2}$ miles, upon which are some islets and rocks. The bottom in the immediate vicinity of this reef is very irregular, changing suddenly from 18 to 11 fathoms on a bottom of coarse sand and broken shells. When rounding the point, more than ordinary care is required, there being no objects on shore by which the position of the outer part of the reef may be known;—the current off it is always westerly, but varies in strength from 1 to 2 miles an hour, according to the wind. It will be prudent not to get into a less depth hereabout than 30 or 25 fathoms.

From point Mala (in the English chart No. 2145, point Judas) a low sandy coast continues in an almost straight line $6\frac{1}{2}$ miles in a N.W. by W. direction to point Guapilon, off which about $\frac{1}{2}$ a mile, are two rocks, awash at low water, whose position is generally denoted by breakers; this point is the termination of the high land which at only $8\frac{1}{2}$ miles N.E. by N. from it rises to the height of 2172 feet, hence it is a very bold headland. All this coast has a shoal extending from it some distance, causing breakers in blowing weather. At 2 miles from point Mala is the little river Tusulubre, the position of which is readily recognised.

When off point Guapilon it will be prudent not to approach the coast nearer than the depth of 24 fathoms, which will be at an offing of about 2 miles; this is on account of the sunken rocks just mentioned. It is said that in the narrow channel between the rocks and the point is a depth of 8 to 10 fathoms.

Port Herradura.—From point Guapilon the coast maintains the direction of N.W. by W., for $8\frac{1}{2}$ miles to a little bay named Herradura where good shelter may be obtained from all winds except those from westward. It is formed on the north side by a bold rocky point, from which a reef extends a short distance; and on the south side by a similar point of land, but bolder, as it consists of a great rounded hill with very high land immediately behind it. Attached to the south point by a reef dry at low tide is an islet, named Cano, which is nearly of the same height as the point; this islet has also a reef extending from it on all sides to $1\frac{1}{2}$ cables' length or more. When the bay was surveyed in 1852, the islet was covered with trees.

Port Herradura has an extent east and west of about $1\frac{1}{2}$ miles, and is $1\frac{1}{2}$ miles wide from shore to shore. The soundings decrease from 20 fathoms at the entrance to 5 and 4 fathoms close to its head. It is or was uninhabited, and as it offers but few inducements for a visit vessels seldom resort to it. Good water in great abundance may be obtained from a stream which falls into its north-east part; it is said that twenty casks may be filled at a time, if they are rolled into the basin. Communication with the interior is very difficult.

The only known danger in port Herradura is a rock, named Havannah, situated in nearly the middle of the bay, upon which the sea breaks at half-tide. It has a depth over it of only 2 feet at low water spring-tides, and is sometimes visible when there is a swell. It lies with a house on the beach bearing N.E. $\frac{1}{2}$ N. $\frac{1}{8}$ of a mile, and Cano pinnacle S.W. by S. $\frac{1}{8}$ of a mile. At full and change of the moon the tide rises about $9\frac{1}{2}$ feet.

When running into port Herradura, it should be remembered that the reef on each side is very steep. Having entered, the usual place of anchorage is off the watering place, in about 5 fathoms.

GULF OF NICOYA.—This large gulf is the most important resort of traders on the west coast of Central America. It extends about 50 miles into the land in a north-westerly direction, and is 25 miles wide at the entrance—between port Herradura and cape Blanco, but it soon begins to decrease in width and at its head is only 6 miles across. It contains numerous islands, all lying off the western shore, some of which are of considerable extent; most of these are covered with trees, and in 1852 were uninhabited. Chira, the largest island, is at the head of the gulf; vessels of very light draught of water can sail round it, but as the channel is intricate, it is necessary to obtain the assistance of some one having a knowledge of the locality. San Lucas island, immediately opposite Punta Arenas, has good anchorage on its north side, to which vessels may run with facility.

When bound into the gulf of Nicoya, shipmasters should provide themselves with the Admiralty chart No. 1931, as it shows the navigation on a large scale. At present, 1867, the only place of trade is Punta Arenas, on the east coast, at about half-way up the gulf.

East coast of the Gulf.—From Herradura point the coast trends northward about $2\frac{1}{2}$ miles to point Sucia, off which a rocky ledge extends westward one mile, and partly shows at low tide; close to the outer edge of this ledge, there is deep water of 18 to 25 fathoms. Hence the coast turns round to N.E. $\frac{3}{4}$ N. $4\frac{1}{2}$ miles, and then trends north-westward, 10 miles, to Calderas bluff, a high rocky point, eastward of which is port Calderas, formerly the principal port in the gulf, but now deserted. Calderas was generally considered to be unhealthy to all new residents, and the higher authorities usually attempted to excuse residence.

From Calderas bluff the coast trends round to the north-westward 8 miles, to Arenas point, off which a bank of $3\frac{1}{2}$ and $4\frac{1}{2}$ fathoms extends $2\frac{1}{2}$ miles in a southerly direction, having a small spot of 10 to 12 feet upon it; this spot lies with the extremity of the point bearing N. $\frac{1}{2}$ W., $1\frac{1}{2}$ miles, and the Pan de Azucar W.S.W. $\frac{1}{2}$ S., $3\frac{1}{2}$ miles. The bank is very steep on the western side, deepening suddenly from 7 to 22 fathoms; but not so on the eastern side, the soundings from it to the eastern coast being 5 to 8, 9 and 7 fathoms.

Arenas point has a shelf of mud extending about a mile westward from it, which is awash at low water. It forms the south bank of a small stream, which has its outlet immediately northward of it. On the north side of this river there is another shelf of mud, which also becomes dry at low water. Upon this point there is or was a small fired light, visible about 10 miles.

The village of Punta Arenas, has not at present, a population of more than 1500. The inner anchorage, named the *Estero*, situated northward of the point, admits at high tide, vessels drawing 10 to 18 feet, and can be entered only with a pilot's assistance. The outer anchorage southward of the point, will accommodate all ordinary vessels, the depth being 5 to 7 fathoms; but this anchorage, being exposed to southerly winds, can be considered safe only during fine weather or with the wind from the land.

The anchorage usually selected during the fine season, from November to June, is immediately southward of the point, with the Pan de Azucar bearing about S.W. $\frac{1}{2}$ W., or Aves islet S.W. The vessel will here be at about a mile from the beach, in $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms on fine muddy sand, and in a position to communicate freely with the village. When the French ship *Brillante* anchored here in 1852, her bearings were, the church, N. 15° W.; lighthouse, N. 18° W.; custom-house, N. 27° W.; Pan de Azucar, S. 52° W.; and Aves islet, S. 43° W.;—at a little eastward from this, the ground was tougher, consisting of mud upon sand, and therefore better for holding;—from this last position the bearings were, the lighthouse N. 28° W., and the custom-house N. 39° W.

In winter it is necessary to anchor further out than as indicated in the preceding paragraph, on account of the inconvenience occasioned by the heavy rollers sent in from the south-westward, which tend to carry the vessel on shore. The position recommended is in $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms, mud over sand, with the custom-house bearing N.W. by N., or the lighthouse N.N.W., and the Pan de Azucar about W.S.W.*

It should be remarked that the soundings which in the passage from the Nigretas islets to the anchorage decreases gradually from 20 and 17 fathoms, to $4\frac{1}{2}$ fathoms on the bank bounding the anchorage, increase again towards the eastern coast to 10 and 9 fathoms. In the immediate vicinity of Calderas bluff, the depth is 15 to 12 fathoms.

When at anchor it is recommended to moor S.E. and N.W. The holding ground is not good, and the anchors are liable to be fouled by the flux and reflux of the sea, and by the moving of the vessel during the sea and land breezes.

Mr. Hull, R.N., H.M.S. *Havana*, 1859, says "the light at Punta Arenas is plainly visible southward of the Sail rock. In not bringing it eastward of N.N.W. vessels will be clear of all danger till the anchorage be reached. We came to in 6 fathoms, with the lighthouse bearing N.N.W. $\frac{1}{2}$ W., distant 6 miles. Both ebb and flood set strongly over the Punta Arenas bank".

It is high water on the days of full and change of the moon at 8h. 10m. The tide rises about 10 feet.

Water for shipping is obtained at the river Baranca, 7 miles eastward from the anchorage. The river may be recognised by a large yellow spot, which is left to starboard when entering. The bar can be crossed only at half flood, or a little before half ebb. The best water is obtained at about a mile from the entrance. Only boats can ascend the river, and the channel is very tortuous. The vessel should be anchored at about $1\frac{1}{2}$ miles from the river, in $6\frac{1}{2}$ fathoms.

Abundance of fresh provisions can be obtained at Punta Arenas, but some difficulty may be experienced in obtaining cattle.

West coast of the Gulf.—Cape Blanco, the west extreme of the gulf of Nicoya, is of moderate height and covered with trees, even to the beach. The land, of which it is the southern termination, is sufficiently high to be visible from the distance of about 25 miles, especially when bearing about N.N.W. At a considerable offing it somewhat resembles an island, but a nearer approach reveals some white spots which help to distinguish the cape from the back land. At about a mile southward from it is an islet of whitish colour, without verdure; this, viewed from a distance, apparently forms part of the main land. The islet is surrounded by a rocky ledge, which dries at low tide, and has deep water of 10 to 30 fathoms immediately southward of it; between it and the shore the depth is $4\frac{1}{2}$ to 9 fathoms.

It is only when the cape bears East and southward of East that the point which actually terminates it can be distinguished. It is much lower than the land in its immediate vicinity, and advances seaward as an island, falling at last abruptly to the water. A needle shaped rock of slender form can then be perceived at a little southward of the islet.

The west side of the gulf from cape Blanco to the islets opposite Punta Arenas, is believed to be clear of any sunken dangers. It may be approached as near as $1\frac{1}{2}$ miles; closer than that would be imprudent.

From cape Blanco, the western side of the gulf trends 11 miles to the N.E. by N., and is free from outlying dangers, except that at about 24 miles from the cape, a ledge of rocks, partly above and partly under water runs 1 mile off the shore, and has deep water of 17 fathoms close to its outer edge. At the end of this distance, 11 miles, the coast bends a little inwards, forming a small bay, named Bullena, where are soundings of 18 and 9 fathoms, shoaling gradually towards its head, which is low land covered with mangroves. The north side of Bullena bay, Bullena head, is of moderate height, and steep, having 14 fathoms at a short distance from it. Hence, the coast trends N.E. $\frac{1}{2}$ N., about 8 miles to the Nigretas islands, and there are, at about midway, two islands, separated from the shore by a narrow channel navigable by boats, named Jasper and Alcatraz, of which the former is the easternmost. The Nigretas are two islands pretty close to each other, which run off $2\frac{1}{2}$ miles from the coast; from the eastern one a ledge of rocks extends a $\frac{1}{2}$ of a mile eastward, and has near its extremity a large rock known as the Sail rock.

From the Nigretas islands the coast trends to the N.N.W., $6\frac{1}{2}$ miles, and has several islands off it, lying more or less near the shore; of these, the largest, about 2 miles westward of Nigretas islands, is named Cedro. At the end of this distance are the islands Aves, Pan de Azucar, and San Lucas; these are surrounded by shoals to a short distance, but separated from each other by soundings of 7 to 11 fathoms.

The channel up the gulf northward of San Lucas islands, between them and the bank extending from point Arenas, has considerable width and a depth of 18 to 27 fathoms, muddy bottom. Hence up the gulf, and failing a pilot, the eye and steady use of the lead will be the best guides.

Directions.—The entrance to the gulf of Nicoya is so wide that no difficulty whatever is experienced in making it. It is usual to steer for cape Blanco, keeping a little eastward of its meridian, and afterwards to direct the course into the gulf; but it appears probable that some advantage would be gained if the land about port Herradura were made instead of the cape, as the effect of the westerly current would thereby be to some extent neutralised,—a mile or two would also be saved in the subsequent route to Punta Arenas.

Having entered the gulf, keep along the eastern shore, as it is shallower than the opposite coast, and also because the effects of the ebb stream which southward of the Nigretas islands, flows south-westward, will not be so strongly felt. The soundings, although great, are not so deep, but that the anchor can be let go in the event of being overtaken with a calm and a contrary current. The flood has occasionally considerable strength, and requires to be guarded against as its tendency is towards the Nigretas islands, in the vicinity of which the water is very deep; close to the south side of the Sail rock the depth is 24 fathoms, deepening rapidly seaward to 36 fathoms. The course hence to Punta Arenas is direct and clear of any known sunken danger. The bank extending southward from the point has already been mentioned.

The following instructions were written in 1843, and are added because they supply some useful hints.

“The entrance of the gulf is safe; the tides, however, at times run strongly, especially at the full and change of the moon. There is ebb and flood, but the former is of longer continuance and much stronger than the latter.

To run in, keep eastward of the meridian of cape Blanco, which is the westerly part of the gulf; and should you round the cape at the distance of from 1 to 3 miles, the course will be about N.E.; or, if you should be about half-way between the cape and port Herradura, the eastern side of the gulf, it will be a little more northerly.

Having sighted the Nigratas, which will show themselves on the port-bow, you will see a rocky point a little eastward of them, having the appearance of a vessel, and hence called the Ship rock, to which give a good berth, leaving it on the port hand. Haul then over to the starboard coast, that in the event of it falling calm and an ebb tide, you may anchor in shallow water; whereas, if becalmed, with an ebb tide, when near the Ship rock, it would be difficult to find anchorage, at least in not less than 20 to 30 fathoms; and if unable to anchor, the ebb tide, which is very strong in this part of the gulf, would drive the vessel back again past cape Blanco. Steer along the starboard coast, so as to pass the extreme points at a distance of from 2 to 3 miles, and you will soon perceive the custom-house of Punta Arenas, towards which shape your course, and as soon as the village is seen, bring the custom-house to bear N.N.W., or the middle of the village N. by W., when you will be in from 18 to 30 fathoms, and see in the distance the point named Punta Arenas. Further out there is a heavy breaking of the sea, occasioned by some sand-banks, which run out a great distance, and partly dry at low water. Westward of these banks are the islands of San Lucas; eastward of which, between them and the banks, there is good anchorage, but in deep water.

Merchant-vessels prefer lying closer in, on account of the proximity of the landing-place and stores. The course indicated above leads ships to this anchorage. The leading mark is the custom-house on with the flag-staff of the port. The depth is about 8 fathoms, muddy bottom, at from a $\frac{1}{2}$ to 3 cables' lengths from the shore.

The banks above alluded to have a tendency to augment and change their position, and the safest course is to keep the custom-house a little open eastward of the flag-staff, keeping the lead constantly going; and should the water shoal, to haul immediately to starboard. If desirous to come to anchor on heaving a ship to, at some 2 or 3 miles from the port, in order to obtain a pilot, it may safely be done, until one comes off and carries you to the place desired.

The custom-house is easily known by its white painted roof; but it should be carefully borne in mind that, from the rapid progress the sea appeared to be making upon this spot, it may soon be removed and another built elsewhere *

It has been stated that ships from southward should make cape Blanco, to obtain a fresh departure for their intended port. Such is the course recommended by the writer of the foregoing directions, who considers it better than to make a direct course for the volcano of Beija, because in winter the winds are light, variable, and attended with calms, and it is frequently the case that the high land is obscured by mists or haze, which renders navigation difficult even to those well acquainted with the coast.

CULEBRA BAY.—From cape Blanco the coast trends north-westward and westward 88 miles to a point of land named Morro Hermoso, from which a reef extends a short distance; afterwards it bends round to N.W. $\frac{1}{4}$ N., 28 miles to point Velas, so named from its resemblance to a sail, off which are some rocks. It is recommended to give all this land a good berth, to avoid any sunken dangers there may be; for it has not been closely examined. It is represented to be, in general, high land covered with trees, with occasionally some sandy plains and small deep bays. From point Velas the coast trends 14 miles north-eastward, to point Gorda, the south-west extremity of Culebra bay.†

* A despatch from H.M. Consul at Costa Rica, states that the port of Punta Arenas ceased to be a free port on January 26th, 1861. *Mercantile Marine Magazine*, 1861.

† The coast westward of cape Blanco as far as Culebra bay is very imperfectly represented in charts, as the delineation is chiefly derived from a sketch obtained during a running survey by Mr. T. A. Hull, R.N., in 1859. M. Lapelin of the French surveying vessel *Brillante* in 1852, gives the name of Guiones to a point of land 30 miles W.N.W., from cape Blanco, which we suppose to be the Morro Hermoso of Mr. Hull's chart, although the latter is there represented 8 miles further westward. M. Lapelin approached cape Blanco from westward and observes "All the coast between points Gorda and Guiones is high and wooded and bordered with a strand of white sand interrupted here and there by cliffs of reddish colour having rocks at their base over which the sea breaks. We coasted it at the distance of 2 to 3 miles, and had soundings of 24 to 27 fathoms. Point Velas is unknown to the pilots. In the positions assigned to points Velas and Morro Hermoso we found neither point nor hill; it was only in lat. $9^{\circ} 53'$, long. $88^{\circ} 12'$, (?), that is to say, in a position 21 miles more south and 12 miles more west than that assigned to point Velas, that we met with a greyish coloured cliff surmounted by some trees, and having breakers at its base to the distance seaward of apparently 14 miles. The sea broke upon some detached rocks, which lie in a considerable number southward of a white sandy islet,

The coast between points Velas and Gorda is quite unknown. It is said to have some islands off it, the outermost of which is named Brunel. Point Gorda, viewed from southward, appears as a great rounded hill with a slight indentation in the middle of its summit; it is higher than the country in its vicinity and its highest part is near the sea.

Port Culebra, the north-eastern part of Culebra bay, is an inlet running about 4 miles into the coast, in a north-easterly direction. At its entrance it is about a mile wide, with soundings of 10 to 20 fathoms, which depth decreases gradually towards the head of the bay, where there are 9 to 6 fathoms. On the south side of the entrance are some islets, or rocks, at a short distance from the shore, called the South Viradores; and on the north side are also two similar rocks, called the North Viradores. Captain Sir E. Belcher observed the north end of the bay to be in lat. $10^{\circ} 36' 55''$, long. $85^{\circ} 33' 30''$. After mentioning various difficulties experienced in finding the port, he describes it in the following terms:—

“At daylight on Sunday, the 25th of March, 1838, we were close off the port, but not being able to detect the Viradores, we wore, and intended running further south; as Kellet had informed me that, in his search for me, he had been unable to find it.

While in the act of wearing, a gleam of sunshine showed an island in-shore, which induced me to make another attempt, and on reaching to windward we opened the heads and discovered the Viradores; but even then could only ascertain from the mast-head that any recess of bay lay within. At noon we entered the heads, and at 9h. anchored in 8 fathoms in this splendid port, justly deserving that appellation.

The port is certainly magnificent, and, from information derived from the natives, I learned that it is connected with Salinas, and thence on to Nicaragua, Granada, &c. If any railway be contemplated in this quarter, it ought to enter at the bay of Salinas, which would render these two ports important. When this portion of the country becomes settled, civilized, and more populous, I little doubt but Culebra will be better known, and probably the chief port of the state of Nicaragua.

Water, fit for consumption, was not found at the beach, but may be obtained a short distance up the creek, which a boat may enter at high water. If wells were dug, doubtless it would be found at the N.W. side, and the surrounding country is mountainous. Another indication in favour of this is the thickly wooded sides and summits, as well as bright green spots of vegetation throughout the bay.

Brasil wood is very abundant. Mahogany and cedar were observed near the beach, but, as people have been employed cutting the brasil, probably all the mahogany and cedar, easily attainable, has been taken.”

From port Culebra the coast trends to the N.N.W. about 20 miles to cape Elena, northward of which are Elena and Salinas bays. All this shore is quite unknown and as usually represented in charts is believed to be very badly

upon which are two rocks resembling sails at a distance. Having from this point run along the coast about 20 miles in an E. by S. direction, we discovered that the land then trended S.E. to cape Blanco. All this coast is steep and covered with trees; the hills were seldom more lofty than those of the country behind the cape; and the sandy beach interspersed in many places by rocky points which formed little sheltered bays, offered great facilities for a landing.”

delineated; it is said to have some islets off it of considerable size. Cape Elena is an elevated promontory of a triangular form, the ridge of the promontory being very irregular in outline, having a somewhat serrated aspect, while its northern side is an unbroken steep escarpment without any indication of verdure. On the south side of this remarkable cape is a cluster of islands, named Murcielagos. Captain Sir E. Belcher, R.N., makes the following remarks on these islands:—

"On rounding the point in view corresponding to point Catalina of Bauza, we discovered a cluster of eight islands. These I determined to examine, as they did not appear on the chart. They almost formed two distinct harbours; the smaller islands forming a crescent by the south, one large island protecting the east, and another of similar size forming the line of separation. Passing into the bay, we anchored in the inner or eastern harbour; and having fixed the positions, surveyed it, and completed water at a very convenient position, where we anchored in 82 fathoms, with a hawser fast to the shore.

We quitted for Salinas, after having satisfied ourselves that Culebra was not near us. The name of this remarkable cape, which we had mistaken for Catalina, is Elena, and the cluster of islands is termed Murcielagos, or Bat islands.

The springs are numerous, and there are tolerable rivulets; but only that which we watered at (between the centre point and the main) is safe to approach, by reason of the constant surf. We found the gulf squalls, even in this sheltered position, come down the gullies with great force, and impede our work as well as endanger our boats. In 48 hours, however, it was finished. The geological structure of the cape and islands is a schistose serpentine, containing balls of noble serpentine."

ELENA BAY.—Elena bay is a large open bay having an extent from north to south of about 4 miles; at its head in its south-east corner, is a small inlet of 11 to 4½ fathoms, named Tomas bay, in which vessels might perhaps be able to anchor and obtain protection from westerly winds,—but this is uncertain. Elena bay is quite open to all winds from westward. In the south part of it, at about a mile from the shore, are some rocks above water, named Vagares; and at the head of the bay off its north-east shore is the small island, Juanilla, inside of which is a depth of 7 to 11 fathoms. The north shore has also an islet off it, named Despensa. The water in this bay is very deep, there being 30 fathoms at 2 miles from its head; whence it shoals gradually to Juanilla island. As there is good anchorage in Salinas bay vessels seldom enter Elena bay.

SALINAS BAY northward of Elena bay is separated from it by a bold headland, terminating in point Descartes. It is a little more than 3 miles in extent, with soundings of 12 fathoms at the entrance, which decrease gradually to 4½ and 2 fathoms at its head, on sand and mud. The northern shore is high land: the southern is comparatively low and flat. In the south part of the bay, at a short distance from the beach, are some rocks above and under water; and in the centre of the bay is a little island, named Salinas, under shelter of which vessels anchor during winter and find protection from westerly winds.

When bound into Salinas bay it is advisable to give a wide berth to point Descartes, because reefs are said to run off from it, in a westerly direction, upwards of a mile. A good mark is the north peak of Orosi, 5149 feet high,

situated about 12 miles inland, bearing E. $\frac{3}{4}$ S. (S. 88° E.), as this will lead to the bay. The depth on the south-east side of Salinas island is shallow for nearly $\frac{1}{2}$ a mile.

SAN JUAN DEL SUR.—From Salinas bay to port San Juan the coast trends $12\frac{1}{2}$ miles in a N.W. $\frac{1}{4}$ W. direction; it has not been surveyed, and should have a wide berth given to it. Cape Nathan, in lat. 11° 9', has some rocks off it above water, and there are also some similar rocks at about midway between this point and San Juan; all these rocks lie off the land at a considerable distance, and as there may be sunken dangers in their vicinity, it will be prudent to avoid their near neighbourhood.

The bay of San Juan del Sur is of but limited extent, being only about $\frac{1}{4}$ a mile across. It is situated in about lat. 11° 16', long. 85° 49', and is by no means easy to find, even when running down the coast, the little bays being all of similar character and appearance; in approaching from seaward considerable assistance in discovering the port is afforded by the mountains Mombacho (4482 feet high), Ometepe (5050 feet), Madera (4190 feet), Orosi (5199 feet), and Miravalles (4700 feet). Mombacho, in lat. 11° 48 $\frac{1}{2}$ ', long. 85° 54 $\frac{1}{2}$ ', bears a strong resemblance to the volcano San Salvador, (in lat. 18° 49', long. 89° 10'), but is not sufficiently lofty to be seen from all directions by an observer at only a few miles from the land. The pointed summit of Ometepe, in lat. 11° 32', long. 85° 34', and the large saddle shaped summit of Madera, in lat. 11° 27', long. 85° 27 $\frac{1}{2}$ ', can be seen in clear weather above the hills between them and the coast. The volcano Orosi, in lat. 10° 59', long. 85° 25', is frequently obscured by clouds; when not so hidden it will be recognised by its double pointed summit, which resembles the pointed roofs of two towers, connected by a vast ridge. Miravalles, in lat. 10° 89' 40", longitude about 85°, can also be seen from almost all directions seaward. From San Juan, the summit of Ometepe bears N.E. by N., and that of Madera N.E. $\frac{3}{4}$ E.

This little bay was selected by Mr. Bailey, who was employed by the government of Nicaragua to make a survey of this part of the country, as the point where the railway or canal from the lake of Nicaragua, projected at that time, 1888, should communicate with the Pacific. High land surrounds it on every side, excepting towards the S.S.W. and W. by S. quarters, in which directions it is open to the ocean. At its head the beach is low and sandy, and on each side the land juts out towards the sea, forming promontories of 400 to 500 feet high. The entrance from the sea is clear, with a depth of water of 9, 8, 7, and 6 fathoms, decreasing gradually to 3 fathoms at the distance of 800 yards from the beach. In every part there is moderately good anchorage, generally on a muddy bottom; and the rise of tide is from 10 to 14 feet.

The prevailing winds on this part of the coast are North and N.E., which blow occasionally with considerable violence; and when such is the case, vessels may sometimes experience some difficulty in making the port. Fresh water can be obtained at a short distance from the beach. Fish is abundant, but nothing else, except firewood, is to be had; the neighbouring lands at present (1888) being in a state of nature, without inhabitants or habitations; nor is there either village or town nearer than that of Nicaragua, at a distance of 7 or 8 leagues. There are a few cattle about.

At the distance of less than a mile from the port of San Juan, there is another port named Nacascolo, which is of nearly the same size and figure;

and, as the land between them is low and nearly level, they might be united by a cut, where it thought necessary. As these places are so nearly adjacent, they could, probably, both be usefully occupied, one as an entrance to, the other as an exit from, the proposed canal.*

M de Lapelin, 1852, does not write favourably of the bay of San Juan. "It is usual to anchor outside the port in 8½ to 11 fathoms, nearer the south than the north side of the bay, and always close to a little bed of rocks which reduces the breadth of the entrance. The bottom, consisting of sand and broken shells, is a very indifferent holding ground against the violence of north-east squalls, and its sharp declivity towards the sea still further increases the difficulty of the anchor retaining its hold; this declivity is, however, of some advantage during the prevalence of West and S.W. winds, which sometimes in winter blow with considerable violence. At this outer anchorage, with on-shore winds, the loss of a vessel is unknown, although instances have occurred of vessels dragging their anchors.

The *Brillante* was anchored in 12 fathoms, sand and broken shells, with the flagstaff of Nicaragua bearing N. 82° E.; south point of the bay S. 49° E.; north point of the bay N. 44° E.; and the volcano of Orosi S. 64° E. We were a little too far from the south point, it would have been better to have brought the flagstaff some degrees more to the north. From this anchorage it took our boats 20 minutes to get to the shore; when the squalls were strong they sought shelter of the south point and found it to be of considerable advantage.

The port consists of a little bay open to all winds from seaward. The bottom, of the same description as the exterior anchorage, does not hold better, and as the anchoring ground is very limited in extent, it will be prudent not to enter the bay but to remain outside. Except perhaps in winter, small vessels may, however, obtain shelter behind the rocks of the north point.

It is not difficult to effect a landing, as boats ground at some little distance from the beach and the surf is not very heavy.

Water is obtained from a well, and is of indifferent quality; it is small in quantity and not easily got. With the exception of fresh provisions at an extravagant price, we could obtain no supplies."

Gulf of the Papagayos.—The portion of coast described in the preceding paragraphs, from port Culebra to the bay of San Juan del Sur, or perhaps as far as cape Desolado in longitude about 86° 35', is known as the gulf of the Papagayos; these are violent winds, which blow with such considerable strength as frequently to cause the loss of spars and rigging.

They commence about the meridian of Leon, long. 86° 50', and when approaching from westward, are first felt off cape Desolado, about 6 miles eastward of Realejo. They decrease about sunset, and attain their greatest force about nine or ten o'clock in the morning.

Captain Sir E. Belcher, R.N., says of this wind or breeze, that its limits may be considered to be included in a line drawn from cape Desolado to point Velas; and it is rather a curious phenomenon, that its strength seldom ranges so far as this chord, but seems to prefer a curve at a distance of 15 to 20 miles from the land.

* The government of Nicaragua decreed in about the year 1840, the erection of houses and the buildings necessary for making San Juan bay a port of commerce, but in 1852 there were only a few wooden buildings pompously called hotels.

Captain Marie says " In this part of the coast, and as far as the entrance of the gulf of the Papagayos, the winds are very light, with frequent calms; the tides setting strong from the N.W. Custom recommends steering along the coast in the gulf, as by so doing it is thought that the squalls are less severe, the winds more steady, and the sea much smoother. I have frequently crossed the gulf, sometimes close in shore, and at other times been forced, by strong winds from N.N.E. to N.N.W., to keep in the offing. In the summer time I have navigated in this locality both near to, and at a distance from the coast, and in both cases met with strong winds, accompanied with sudden and heavy squalls, which are almost immediately followed by calms; great care is therefore necessary. I have always taken the precaution to keep from one to three reefs in the topsails, taking care promptly to shorten sail when the squalls came on, and then keeping as close to the wind as possible, with a good full sail, so as easily to make cape Desolado, and have thus been enabled to cross the gulf with this sort of weather in about 12 or 15 hours. The winds generally enable ships to make a N.W. course, but in order to keep in with the coast, it is desirable, as the squalls subside, to steer, if possible, a little to windward of that point."

M. de Lapelin states " In the gulf of the Papagayos, and on other parts of this coast, northerly gusts come without any announcement, being felt suddenly with a cloudless sky equally as when there is a calm or fog. In accordance with the opinions of most navigators, I consider that it is better to keep along the land at the distance of 5 or 6 miles than to get out to sea, because at this distance the gusts, although perhaps more sudden, have less strength and have not such long intervals between them—sometimes indeed these intervals do not exist at all, and instead of them is met a continuous breeze freshening every moment. If the opinion of Sir E. Belcher, R.N., be correct that the gusts prevail most at the distance of 15 to 20 miles from land, it follows that if the shore cannot be coasted at the distance of 5 or 6 miles, it would be better to keep outside at about 80 or even 45 miles from land; the gusts will there to a very considerable extent lose their force and become less sudden, the sea also will not be so heavy and trying. As the vessel advances northerly towards the coast, the direction of the wind becomes more easterly, and it is often possible to reach Realejo in a direct course without tacking."

The Coast.—From port San Juan del Sur to Realejo the coast trends N.W. $\frac{1}{2}$ W., 112 miles, and is in general bold with soundings of 10 to 12 fathoms at a short distance off it; it has not been surveyed, and should consequently have a wide berth given to it. A point of land, but slightly projecting from the general outline of the coast, in about lat. $11^{\circ} 58'$, will be recognised by its desolate appearance, and hence has obtained the name of cape Desolado. The rocky cliffs of the cape are not lofty, but are steep; on its west side is a little plateau with stunted trees upon it, and its south-east side is of reddish colour and bare of vegetation. It is believed that off all this coast, as far as Realejo, there are no detached sunken dangers, with the exception of the Conway, situated $2\frac{1}{2}$ miles south-eastward of Castanon bluff, on the south side of the entrance to the port*; the Admiralty chart No. 2146

* The Conway reef should have a wide berth given to it, as the bottom in its immediate vicinity is so very irregular that there may be dangerous sunken rocks near it. If the west point of Cardon island be kept open of Castanon bluff, about N.W. $\frac{1}{2}$ W., it will clear it in 7 fathoms on its south side; this is quite close enough to approach the reef.

has, however, a reef extending off from the coast about $1\frac{1}{2}$ miles in lat. $11^{\circ} 47'$, or about 16 miles south-eastward from cape Desolado. M. de Lapelia describes this coast in the following manner, sailing down it from Realejo.

"From Castanon bluff to cape Desolado the coast is very low, wooded, of even outline, and sandy. Apparently it has no sunken danger off it except the Conway, the rocks of which are above water, and whose position is always sufficiently indicated by breakers. As cape Desolado is approached the sandy beach will be observed to be bounded in some places by little wooded cliffs, while in other parts rocks extend out a short distance into the sea. In all this section the soundings, which are of sand and mud, are deeper at the same distance from shore, than they are northward of Realejo; at 2 to 6 miles from the land, the depth is 11 to 22 fathoms.

The cliffs of cape Desolado are succeeded by a sandy shore, which soon rises a little and forms a long arid bare escarpment, named Costa Tosca. The southern part of this escarpment gradually decreases in height until it is lost in the drowned land of a little hollow in which is situated the creek of Tamarinda. At 6 miles from the Costa Tosca the bottom, of mud, is of the depth of 16 to 18 fathoms, which at a short distance further out suddenly increases to 22 fathoms. Off the beach of Tamarinda, the bottom is apparently level in a depth of 16 fathoms, but the soundings were not sufficiently numerous to establish this with certainty.

From the beach of Tamarinda the coast rises a little and becomes as high as that of Tosca; it contains here and there sandy creeks and cliffs against which latter the sea generally breaks with violence. All this land is remarkably little undulated, and behind it will be seen the volcano of Mombacho which bears a close resemblance to that of San Salvador, being a rounded mountain whose summit rises into a peak."

Mountains.—The mountains in the vicinity of Realejo are very lofty and visible from many miles at sea. They are known as the Marabios mountains. Commencing with Momotombo on the shore of lake Managua, which is said to be 6000 feet high, they advance almost parallel to the coast and terminate in that named Coseguina on the south-east side of the gulf of Fonseca, which is estimated to have an elevation of 8800 feet. When viewed from the sea off Realejo, at an offing of some miles from the land, at least eight of these remarkable mountains can be seen at one time, supposing the weather to be favourable; of these Viejo and Momotombo are very conspicuous and easily recognised not only by their great height but by their form and position. The peaks in succession from Momotombo are Axusco, Las Pilas, Orota, Telica, Santa Clara, and Viejo.

Viejo mountain appears in the offing opposite Realejo as a magnificent cone, having a very perceptible cavity at its summit; it is 5557 feet high, and apparently rises from other mountains, of which the smallest and westernmost has a well marked conical form. Momotombo, an active volcano, is a lofty mountain whose sides are at a very sharp angle; it rises from lake Managua, form as boldly and well defined as a pyramid, and hence cannot fail to be recognised at once, especially as it terminates the chain of mountains in an easterly direction. When viewed from the sea at some distance southward of Realejo, Momotombo appears as an immense isolated mountain, but when seen from Cardon island it is joined to Axusco, a volcano of less height, the two mountains then revealing themselves as perfect cones.* Las Pilas, 3015 feet

* In lake Managua near Momotombo mountain, is an island which rises into a mountain of conical form, named Momotombita. This is of much less elevation than Momotombo

high, has two rounded summits of almost equal height which give its top a saddle-shaped appearance; it is not sufficiently lofty to be seen from the offing;—this volcano became active in 1850, after remaining quiet many years, a crater having then opened at its base. Telica is the most remarkable of the mountains between Las Pilas and Viejo; it is a cone of extremely regular outline, which appears to be connected to Viejo, of which it has about half the altitude, but from which it is in reality separated by a wide interval containing the mountain Santa Clara;—on the eastern side the mountain Orotá is between it and Las Pilas.

Having obtained sight of and recognised these mountains, it is easy to make the port of Realejo, even from a considerable distance in the offing, for both Viejo and Momotombo are visible at about 60 miles from land. If Viejo is brought to bear N.E. by N., and kept thus in approaching the coast, it will lead to Cardon island, which is sufficiently high to be visible from a distance of 7 or 8 miles, where are soundings of 88 to 45 fathoms. When Viejo is recognised, if it should be on a bearing eastward of N.E. by N., a course should be steered to get Momotombo on the bearing of E. $\frac{1}{4}$ N., or Telica N.E. by E. $\frac{1}{4}$ E., either of which will also lead to the port.

If it should so happen that the mountains are hidden by clouds, it is necessary to make the land south-eastward of the port, somewhere in the vicinity of cape Desolado, because of the current which is almost always to the N.N.W.* The coast should then be followed in about 10 fathoms water, and care should be taken as Realejo is approached, to keep the west point of Cardon island well open westward of Castanon bluff, to avoid Conway reef; on getting nearer the port the same end of Cardon island should not be brought westward of North on account of the Castanon shoals.

REALEJO.—The port of Realejo, formed by the outlet of two rivers named Realejo and Telica, is situated in about latitude $12^{\circ} 27'$. The land on each side for some distance is low and wooded; that eastward of it close to the sea is higher than that to westward, but its elevation is not more than 80 feet, and Castanon bluff is only 40 feet high. The outlet is between the main land, of which Castanon bluff is the extremity, on the *east* side, and Aserradores island (a long island lying along the land to the north-westward, and whose western side is the sea-beach) on the *west* side; and, facing it is the small island named Cardon already alluded to. The town of Realejo is about $4\frac{1}{2}$ miles from Cardon island, and has a population of 1200 to 1500, the males of which are employed chiefly in attendance upon and providing for the wants of the vessels that frequent the port. There is a custom-house with its staff of officials, and some merchants reside here who supply the interior with European goods. Chinendega, 6 miles northward of the town, and having a population of about 5000, being the principal place of business. At 18 miles eastward from the port is the city of Leon; it has been proposed to construct a railway from this city to lake Managua, which it is considered might be effected without difficulty, but neither the population nor trade of the district appear to be sufficient to warrant such a step at present, unless as the act of the government.

and not visible from the port of Realejo, but it is very distinctly seen over the land, when advancing southward along the coast. The two mountains are similar in shape.

* This is chiefly necessary in the months between November and May, as the usual winds are then from north-eastward and blow, occasionally, with considerable violence out of the gulf of the Papagayos; at such times a strong current sets along shore to the north-westward.

Cardon island, in front of the port, divides the entrance into two channels, the Cardon on the north, and the Barra Falsa on the south. It is about $\frac{3}{4}$ of a mile long, and a cable's length broad at the south end, whence it increases a little in width towards its other extremity. It is of moderate height, and its north-west part, cape Ponente, appears of a brownish red colour; on the side towards the land are cliffs, which are almost perpendicular. When viewed from some distance in a S.S.E. direction, the north end of the island resembles a huge rock separated from the island by a narrow channel. Its highest part, the north-west end, is only 80 feet high. There were only very few trees on the island in 1852 when the survey was made upon which our remarks are based, and these were in its north and east parts; the remainder was covered with little shrubs. These trees formed a valuable means of distinguishing the island from Manzana, an islet off the coast at some few miles north-westward from Realejo, which otherwise so closely resembles it as to be called the False Cardon. In 1888 a tree, standing by itself, on the north-west end of the island, was an excellent landmark, and subsequently a mast bearing a barrel was erected near it; these may yet be standing. Viewed from seaward, Cardon island stands out conspicuously from the low land behind it, appearing not unlike a wedge, of which the highest part will be the cliffs just alluded to. Its western end consists of a sandy beach, and at its south end are some detached rocks.

Barra Falsa.—This, the southern channel into Realejo harbour, is between Cardon island and Castanon bluff; the latter will be easily recognised because it is the western part of three islands running off from the main, and connected to it and each other at low water by dry sand. It is about $\frac{3}{4}$ of a mile wide from shore to shore, but the channel-way is not more than a cable's length wide, being narrowed by the shoals on each side. In 1865 there were about 15 feet water in the deepest part of the channel, and as this was 10 feet less than in 1852 there are reasons for believing that it is filling up.

The south-west side of Cardon island has a bank of $8\frac{1}{2}$ to $4\frac{1}{2}$ fathoms extending from seaward to the distance of nearly a mile, which, from the irregularity of the soundings upon it, is known as the Castanon shoals. As both ebb and flood flow towards this bank, more than ordinary care must be exercised in using the Barra Falsa channel; indeed, it should not be attempted without a strong leading wind.

Cardon Channel.—This is the best, and probably now (1865) the only entrance into Realejo harbour. It lies round the north end of Cardon island, between it and Aserradores island, and is nearly $\frac{3}{4}$ of a mile wide from shore to shore, but the breadth of the channel-way is only about $\frac{1}{10}$ of a mile, being contracted to that width by the Sawyer bank, a shoal running off from the south-west end of Aserradores island; the channel is consequently close under Cardon head. The depth on the shoalest part of Sawyer bank is only 3 feet, and its edge is very steep, the lead at once falling from 3 fathoms into 9 and 10 fathoms; sometimes this edge is indicated by breakers, but more frequently not, for which reason and also because the tendency of the flood is towards it, additional care is required when in its immediate vicinity.

Shoal water, having a dangerous patch at its extremity named Gorgon shoal, extends out a short distance from the north-west side of Cardon island. This patch is about $\frac{3}{4}$ of a cable's length due North from the rock off Ponente point, and there is a depth of about 6 fathoms close to it.*

* Gorgon shoal or rock was discovered in 1849 by Commander J. A. Paynter, R.N., of

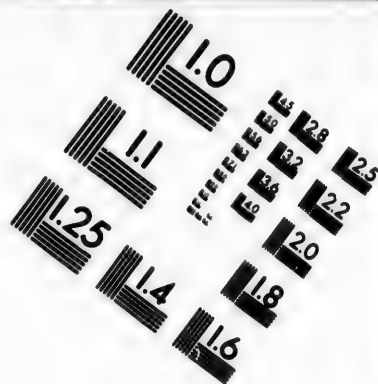
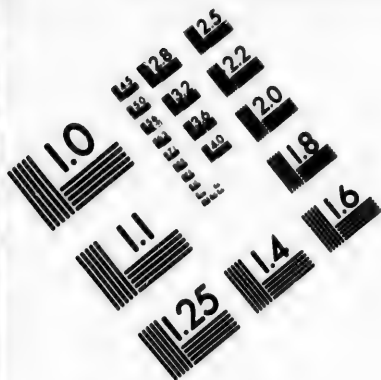
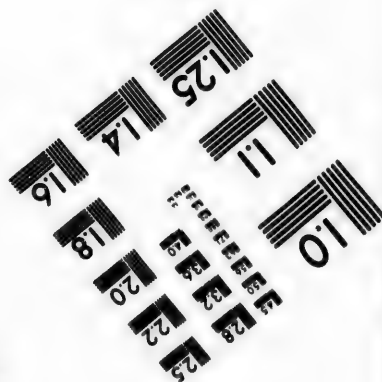
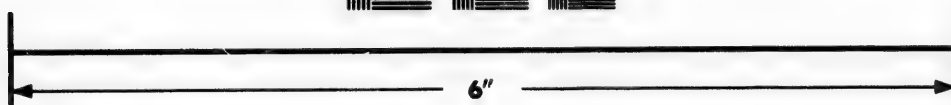
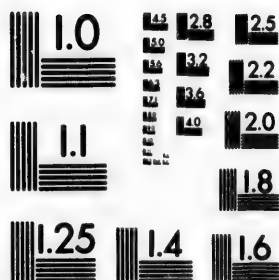


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Cardon channel should not be attempted without a pilot, and especially because there are reasons for believing that considerable changes in it have taken place since the survey in 1838. At that time the leading mark for making the channel was, the low south end of Aserradores island well open of Cardon head, until Ponente point bore S. by W., when it was necessary to change the course to south-eastward in such a manner as to sail close round Cardon head.

Having entered the port through Cardon channel, soundings of 6 and 7 fathoms will be found for some distance within. There is complete protection from all winds, and Cardon island and the shoals at the entrance keep out all heavy seas.

It is high water at Cardon island on the days of full and change at 8h. 6m. Spring tides rise 11 feet. At Realejo the tide rises an hour later.

Exterior Anchorage.—The anchorage outside Cardon island is safe only during fine weather, consequently when it is intended to make a lengthened stay at the port it is most prudent to enter the river. A very large vessel should anchor with the north point of the island bearing East or E. $\frac{1}{4}$ N., in $6\frac{1}{2}$ to 8 fathoms, bottom of mud and black sand; if in a position more northward than this, the same soundings will be found at a greater distance from the land but not from the shoals, and if more southward a heavier sea is generally met with. This is the winter anchorage for all vessels.

In fine weather, vessels may anchor close in at about a mile W. $\frac{1}{4}$ N. to W. by N. from Cardon island, with Viejo mountain bearing N.E. by N.; the depth here will be $4\frac{1}{2}$ to 5 fathoms, sand and mud.

In 1852 the French surveying-vessel *Brillante* anchored here in $4\frac{1}{2}$ fathoms, with Viejo mountain bearing N. 84° E.; Momotombo in one with Cardon island N. 87° E.; Telica N. 68° E.; and the north-west point of Cardon S. 88° E.

At this anchorage the flood stream flows from N.E. to E.N.E., and the ebb the contrary, with a mean strength of about $\frac{1}{6}$ of a knot per hour.

The port of Realejo was surveyed in 1838 by Sir Edward Belcher, R.N., who says:—"Cardon island is of volcanic origin, and the beach contains so much iron, that the sand, which probably is washed up, caused the magnetic needle to vibrate 21° from zero. I do not believe, however, that the needle was much, if at all, affected on the summit of the island, where our observations were conducted. Our position was on its new cliffy angle. The boats having examined and found the anchorage safe, the *Sulphur* was brought in and anchored within the island of Aserradores, in perfectly still water, 4 fathoms, mud.

On the island of Aserradores our tide-gauge was established, being free from undulation, although directly open to seaward through Barra Falsa; and we were fortunate enough to find a good well of fresh water close to the beach.

Trusting to the accounts I had read of the magnificence of this port, I had fully intended placing the ship near the town. The visit of the Captain of the

H.M.S. Gorgon. It had then 11 feet water upon it, and from it the south point of Aserradores island bore N. 80° E.; Cardon head S. 87° E.; and point Ponente S. 14° W. (Variation 9° E.) To avoid this rock, steer towards the entrance with Cardon head touching Icaos point, and when at a good cable's length from point Ponente stand out N.E. by N. until Castanon bluff opens out from Cardon head, then round Cardon head at a short distance, remembering that the current flows over Sawyer bank.

port soon undeceived me. He assured me that at low water not more than 8 feet would be found near the town, and so narrow, that there was barely room for the oars of my gig, and then only by careful steerage. Indeed, I found, that although the ship might be warped 2 miles higher up, she would there be entirely shut from any breeze, her yards probably locked in the trees, and swarming with mosquitoes.

This port, if a settlement were established on the islands of Aserradores, Cardon, or Castanon, would probably be more frequented; but the distance from the position where vessels usually anchor (within Cardon) to Realejo, is a sad drawback to vessels touching merely for supplies. Rum is also too cheap, and too great a temptation for the seamen. Supplies of poultry, fruit, bullocks, grain, &c., are, however, very reasonable, and of very superior quality; turkeys are said to attain an incredible weight; they still, however, justly maintain a very high reputation.

The present village of Realejo (for the name of town cannot be applied to such a collection of hovels) contains one main street, about 200 yards in length, with three or four cross openings, leading to the isolated cottages in the back lanes. With the exception of the houses occupied by the commandant, vice-consul, administrator of customs, and a few others, there is not a decent house in the place. The ruins of a well-constructed church attest its former respectability. The inhabitants generally have a very unhealthy appearance.*

Realejo was visited in 1859 by H.M.S. *Havana*, Captain T. Harvey. The following is from the journal of her voyage:—"There is a little island off the north point of Aserradores island, which, to a stranger, makes very much like Cardon. It has deceived many, and at Realejo we heard that one vessel had been lost by the mistake; we made it at about 5h. p.m. on June 4th, and supposing it to have been Cardon, ran for it till we saw breakers right across our course. We hauled out S.E., running along in 14 to 16 fathoms, good holding ground. At Realejo we took the ground while anchoring on the bank opposite to Ieacos point, being deceived by its white beach, but we soon hove off into 7 fathoms, good holding ground, with cape Austro, the south-east end of Cardon, bearing S. 46° W. The difficulties of the port disappear after the first visit.

Entering Realejo, stand in with Cardon head bearing East or E. $\frac{1}{2}$ S., which will carry you clear of the Gorgon rock.* From the head steer S.E. by E. for the end of Castanon bluff until the east point of Cardon island bears S. by E.; then steer E.N.E. to the anchorage. There is nothing to fear off Ieacos point and you may anchor off the houses in 5 or 6 fathoms. Going out, a boat anchored on the south-west point of the shoal off Aserradores island will be found very useful. The tide sets across the southern channel; both ebb and flood set through Cardon channel.

The water at point Ieacos was not found fit for ship's use. Whether the troops (some 400 in number) in the neighbourhood brought it to the state in which we find it or not I cannot say, but from its appearance it could only be necessity that would oblige one to take it. There is good water to be obtained at about 5 miles above, in a stream, at dead low water, which would prevent more than one turn a day generally, and the position is so unhealthy at the

* There is apparently an error in these bearings. See the Admiralty chart No. 1927.

season we visited it that we took none. Beef, stock, and fruit plentiful and good. Vegetables scarce and difficult to find."

The Coast.—From Cardon island the trend of the coast is about N. W. by W. along Aserradores island, which is low and well wooded, and has a sandy beach. A near approach to this shore is not recommended, because, if the wind should subside, the current and swell would soon drift the vessel on shore. During winter, when the wind sometimes blows from S to S. W. with rainy weather, there is also danger in remaining at anchor off it, as the sea runs very high.

At a short distance north-westward from Aserradores island is the small round islet, named Manzana, already alluded to, which is covered with trees, and has a beach of a whitish colour; between it and Aserradores is a channel nearly dry at low water, at which time it appears to consist of a single bed (plateau) of rocks. It is dangerous to attempt this passage, even in a boat, unless in very fine weather and at nearly high water. Between Manzana and the main is another passage, even more dangerous than that just mentioned; for, although the sea in it breaks less, and consequently does not so readily shew the rocks and sandy shoals, there is much less water upon them than is found in the other channel.

It has been already stated that vessels bound to Realejo, and unacquainted with the bearings necessary to make the entrance of that port, have occasionally mistaken Manzana for Cardon, and Aserradores for Castanon, and the passage mentioned for the entrance to Realejo; so that great caution is necessary when sailing along this coast not to be deceived in the appearance of the land.

It is said that north-westward of Manzana are rocks extending out some miles, upon which the sea breaks violently. They are reported to extend along the coast as far as the parallel of the Mesa (Table) de Rolland, a small mountain close to the beach, with a flat top. The statement is that they border the coast, are separated by channels, and have between them and the shore smooth water. Hence to point Coseguina, at the entrance to the gulf of Fonseca, the coast has a north-westerly direction.*

M de Lapelin of the French surveying vessel *Brillante*, 1852, makes the following observations upon this coast. It will be observed that he approaches Realejo from north-westward.

"The frequent wrecks that have occurred on this coast in consequence of mistaking Manzana for Cardon, when the high lands are concealed, is our reason for the following detailed remarks.

As to the coast itself, although low and in some parts fronted by shoals, it is by no means dangerous if attention be paid to the lead, for the soundings off it are regular; it is, however, to be noticed that the depth of 8 to 11 fathoms, within which it is not prudent to approach, prevails at a greater distance from it than from any other part of the coast.

Point Coseguina, the south-east point of the gulf of Fonseca, in its western

* The coast between Realejo and the gulf of Fonseca has not been surveyed, and is known to be very imperfectly delineated in charts. A reef, named Speck, is inserted in the Admiralty chart No. 2147, in about long. $82^{\circ} 27'$, or at about 7 miles from Manzana islet, and 20 miles south-eastward from Coseguina point; it apparently extends 2 miles from the land, has $2\frac{1}{2}$ fathoms upon its extremity, being in other parts awash or nearly so, and close to its outer edge are soundings of 6 and 7 fathoms;—unfortunately we have no detailed account of it.

and southern parts presents to the sea moderately high and almost perpendicular cliffs; its northern part is, on the contrary, very low, as it consists of a sandy beach. Vessels may safely approach it from all directions, even to within the distance of a mile, if a depth of 8 to 5 fathoms be maintained; but during the flood, this offing would not be sufficient, as it might carry them into the Estero Real, towards which it flows with a strength of $1\frac{1}{2}$ to 2 knots.

Having doubled point Coseguina, the coast for some miles in a south-easterly direction will be observed to consist of steep cliffs, which gradually decrease in height as they recede from the point, and these are followed by a sandy beach which at last disappears to the south-eastward in a large depression (*enfoncement*) of land which is continued as far as the Mesa de Rolland; this flat land is so low and flooded, that it could not be perceived from the bridge, although we approached it to the depth of 8 fathoms. The cord of this great arc is indicated by a line of breakers, towards which the soundings from sea decrease gradually but rapidly, for the depth of $9\frac{1}{2}$ fathoms which hitherto prevails at the distance of 2 miles from the land, is now 5 miles from the breakers.

The Mesa de Rolland is the extremity of a little mountainous chain, which runs from the interior in the direction of the sea. It is easily recognised by the plateau of which its summit consists, and by the large reddish coloured spots which occur in parts where there are no trees. Similar spots may also be observed upon another flat topped mountain, situated a little more in the interior.*

From the Mesa de Rolland to Cardon island the coast is almost straight; it is low, wooded, and at the beach consists of gray sand. The bottom off it is so level, that at the distance of 6 miles parallel to it, the depth is only 11 fathoms on muddy sand.

When nearly on the meridian of the Mesa de Rolland, a group of trees will come into view, detached from the coast in a manner very similar to what a low wooded point often appears; this is Manzana island or the False Cardon. When advancing towards it, heavy breakers will be seen upon a bank near it which leaves apparently a passage, but which channel does not exist, being barred by sand banks and rocks. The island is only 16 feet high, but the trees upon it render it visible at the distance of about 8 miles; as these trees are almost of equal height, their tops form nearly a level line. Its beach consists of a whitish gravel, which from a short distance presents the appearance of a belt of white sand. It terminates in a very gentle declivity, especially on its south side, where its extreme point is connected to Aserradores island by a bank under water, upon which the sea almost always breaks, and over which there is such little depth that it completely closes the channel.

In the event of the mountains being seen it is impossible to mistake Manzana for Cardon, for Viejo bears E.N.E. from the former island and N.E. by N. from the latter. Viejo is so lofty that its summit is often hidden by clouds; in such an event, the volcano of Telica, a perfect cone south of and not very far from it, whose summit is rarely concealed from view, is very useful as a mark,—from Manzana it bears East,† and from Cardon E.N.E.†

Continuing along the coast of Aserradores (which island is apparently part of the main land) in a depth of 11 fathoms, Cardon island will rise into view

* If these peculiar appearances are occasioned by drought, they will most probably be green during the rainy season.

† These are apparently true bearings

before Manzaná, which by that time will present the appearance of a large wooded and half submerged island, disappears. This island although only 88 feet high in its most elevated part, will appear high compared with the land in its immediate vicinity."

GULF OF FONSECA.—This large inlet contains one of the most important ports on the Pacific coast of Central America, namely La Unión. The gulf reckoning from shore to shore, has an extent of about 28 miles north and south, and of nearly 80 miles east and west, and over nearly the whole of it, wherever the depth of water is suitable, is excellent anchorage. Although known chiefly by the name of Fonseca, it is also called Amapala, Conchagua, Coseguina, Omatapa, and San Carlos, the latter being derived from its principal port San Carlos now La Unión; by English shipmasters it is recognised as the gulf of Fonseca.

In the north-western part of the gulf are several islands of considerable size, of which that most to seaward is Manguera. These will be described subsequently.

The mainland is divided between the states of Nicaragua, Honduras, and San Salvador. The islands belong only to the two last mentioned states, and these are arranged as follows; Honduras possesses Amapala or Tigre, Sacate Grande or Velasquez, and Disposicion,—San Salvador owns Conchagua, Manguera, Perez, and Punta Sacate. The islands are all of volcanic origin and extremely beautiful in appearance.

Each of the states has a port in the part it possesses. That of *La Unión*, belonging to San Salvador, although the most important in the gulf, is only a small place, boasting of a population of perhaps 700 or 800, but it derives its importance from its proximity to the city of San Miguel, which in February and November (when its fairs are held) becomes the most commercial town in Central America. *San Lorenzo*, belonging to Honduras, is on the river Nacome, which is too shallow to admit foreign vessels, and is consequently only visited by the small trading craft of the country.*

Playa Grande, in the Estero Real, belonging to Nicaragua, is on the left bank of the stream, and so rarely visited as to be a place of but little commercial importance. This arm of the sea is fronted by a bar, having over it a depth of 16 feet at low tide; all vessels that can cross this may sail 80 miles into the interior, and those of only 10 feet draft fully 60 miles.

Point Coseguina, on the south-east side of the gulf, has been already mentioned (see page 60). Although it is there stated that it may be approached to within the distance of a mile, shipmasters should be aware that according to the Admiralty chart No. 1960, a reef extends from the point about $\frac{1}{2}$ of a mile; hence it will be prudent not to get very near it when entering or leaving the gulf. The same chart also shows a reef running off from the land a similar distance, at $8\frac{1}{2}$ miles northward from the point. A safe offing is apparently in soundings of 7 and 8 fathoms.

Estero Real.—At nearly 12 miles north-eastward from point Coseguina is point Monypenny, which is low and swampy, and has immediately under it a little river or lagoon. Hence the coast takes a sudden turn in a south-easterly direction, about 14 miles, to the mouth of the Estero Real, and is low

* The government of Honduras has recently declared the anchorage of Amapala, Tigre island, a free port, in the hope that its central position, may make it a resort of foreign merchant ships.

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all the way, but rises inland to high mountain land. The depth within the bar of this river is 5 fathoms, rapidly deepening to 6 and 7 fathoms, which is maintained for many miles. Sir E. Belcher R.N. ascended it about 80 miles in the surveying vessel *Sulphur*, and could easily have gone further, had not the strong head winds rendered the toil of towing too heavy. In reference to it he says "I am satisfied that the stream could have been followed many miles higher, and have not the slightest doubt that it is fed very near lake Managua I saw the mountains beyond the lake on its eastern side, and no land higher than the intervening trees occurred. This, therefore, would be the most advantageous line for a canal, which, by entire lake-navigation, might be connected with the interior of the states of San Salvador, Honduras, Nicaragua, and extended to the Atlantic. Thirty navigable miles, for vessels drawing 10 feet, we can vouch for; and the natives and residents assert 60 more; but steamers will be absolutely necessary to tow against the prevailing breezes."

About 8 miles within Coseguina point is the volcano of that name, notorious for its frequent emissions of dust, ashes, and water. Its summit is about 3800 feet above the level of the sea, and can be seen at the distance of nearly 70 miles in clear weather. The verge of the crater is $\frac{1}{4}$ a mile in diameter. The interior walls fall perpendicularly to a depth of about 200 feet, when the bottom of the crater becomes flattish, with a small transparent lake in the centre. The last grand eruption of this volcano occurred on the 20th of January, 1835, and was attended with the most disastrous effects.*

From the Estero Real the coast trends round N.N.W., about 80 miles, to the head of the gulf, and has soundings of $1\frac{1}{2}$ to $3\frac{1}{2}$ fathoms, at 4 miles from the shore; some dry patches lie in the direction of E. by N., 6 miles from Monypenny point.

Amapala Point.—The western side of the gulf, point Amapala, is of moderate height, and bordered by a reef of rocks and sands extending some distance into the sea, and causing heavy breakers; thus enabling it to be easily avoided. Outside the point, at a short distance, is a depth of 6 to 8 fathoms.

From point Amapala the shore bends in north-westward to the outlet of a small river, and then turns north-eastward, 9 miles, to Chicarene point, round the north side of which is port La Union.

The volcano Amapala, the summit of which is $1\frac{1}{2}$ miles inland in a W.S.W. direction from Chicarene point, rises to the height of 3866 feet. It has not the conical form so characteristic of the volcanoes of this part of Central America. It is a large mountain, with two summits contiguous to it; of which, the highest has a gradual slope and is in parts crowned with trees,—whilst the other, of a very rounded form, is covered with the herb named *Sacate*. The second summit is the true crater of the volcano, and has been extinguished for many years; it differs little in elevation from the first, upon which is or was a signal staff.†

* The summit of the volcano fell in; until then the mountain was almost as lofty as Viejo. It now presents so remarkable an appearance, that coupled with its near vicinity to the sea, it cannot be mistaken for other mountains on the coast.

† The existence of this staff is doubtful, as it was of but little use as a mark, not being visible with sufficient distinctness from the offing. The herb *Sacate* covers the whole country except where there are trees. It has a long and strong fibre, and in the dry

La Union.—Immediately northward of point Chicarene is the bay forming port La Union. It extends 8 miles in a north-west direction and is about $8\frac{1}{2}$ miles broad, reckoning from shore to shore, but the whole of this is not available for anchorage as extensive oyster beds and mud flats, dry at low water, line the northern shore, and contract the space in which shipping can be accommodated to not quite half that extent. The western and northern shores of the bay are low. The town of La Union is on the south shore, at about $4\frac{1}{2}$ miles from the entrance; a small pier runs off from it for the convenience of boats, close to the head of which is a depth of 4 to 7 feet at low tide.

From the foregoing paragraph it will be seen that the deepest water in the port is off the south shore. The depth from point Chicarene to the town is 8 to 4 fathoms, and vessels may anchor in almost any part of it if precaution be taken not to get so close to the mud flat as to ground when the tide falls. It is common for very large vessels to anchor just within the entrance in 6 to 5 fathoms, mud, before the north point of Punta Sacate comes on the bearing of East, as they are then sufficiently sheltered from the heavy seas sent in by strong winds from southward and not exposed to the intense heat prevalent further within the bay. Vessels of 300 or 400 tons generally anchor at 2 miles south-eastward from the town, in about 6 fathoms, mud, nearly midway between the town and point Chicarene. Small merchantmen anchor at about $1\frac{1}{2}$ miles north-eastward from the town in $5\frac{1}{2}$ to $8\frac{1}{2}$ fathoms, on mud of a very tenacious quality; in this position it is necessary to preserve a good scope of cable, because northerly winds sometimes blow with great violence.

If it be intended to remain only a short time in this part of the gulf of Fonseca, and it be not convenient to enter the bay of La Union, vessels may anchor in the channel formed by the islands Conchaguita and Punta Sacate and the coast. The best place will be at about $\frac{1}{2}$ of a mile southward of the watering place* of Chicarene, in 6 or 7 fathoms, mud, with point Chicarene bearing about N. $\frac{1}{2}$ E., and the north point of Conchaguita S.E. by E. $\frac{1}{2}$ E. Such a berth should be selected as may place the vessel as much as possible out of the influence of the violent sea which prevails here when the ebb is opposed by a strong sea breeze; and, it is recommended to moor north and south because of the current.

The bay of La Union affords, in fact, a land-locked anchorage. It is not considered desirable to take up a berth directly opposite the town, because in summer it occasionally blows so hard from northward, that if the anchor drag the vessel might be on shore before another could be let go. In some parts of it the holding ground is not good.

It is high water at La Union on the days of full and change at 8h. 15m. Springs rise 10 $\frac{1}{2}$ feet; neaps 8 $\frac{1}{2}$ feet; neaps range 7 feet. The tides

season gives the lands covered by it a peculiar yellow appearance, so that, where it not for their great extent they might be mistaken for fields of ripe corn. As the termination of the dry season approaches the whole country covered by it is parched and arid to a degree, and then appears of a reddish colour; immediately after the commencement of the rains, this changes to a pale green colour and presents the appearance of young sugar canes.

* This watering place is at rather more than a mile south-westward from point Chicarene. Although the surf here is occasionally very heavy, especially during a breeze from seaward and at full and change of the moon, water can be obtained with facility either by the hose or by filling the barrels on shore. The water is very superior in quality to that obtained from the wells of La Union.

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are regular, except in the rainy season, when the ebb continues rather longer than the flood;—at the entrance of the bay, between point Chicarene and the island Punta Sacate, they flow (especially the ebb) sometimes at the rate of 8 knots and cause a strong race which has the appearance of breakers,—in the vicinity of the town the rate is seldom more than 2 knots.

When bound to the bay of La Union, steer for the island Conchaguita, (subsequently mentioned,) and pass it at a short distance on its west side, as you will thus avoid getting into the bay on the north side of Amapala point, towards which the flood tends. If obliged to tack there is plenty of room, but Amapala point should not be approached nearer than the depth of 10 or 9 fathoms, because of the reef which surrounds it, the edge of which is steep; as the sea usually breaks on this reef it is not difficult to avoid. It will be prudent to preserve an offing from the land at least $1\frac{1}{2}$ miles when in the vicinity of this point.

When passing through the channel between Conchaguita island and the coast it is recommended to keep over towards the shore of Amapala volcano, to obtain the advantage of the flood which here flows northward; and, this course should be followed even as far as Chicarene point, because immediately Conchaguita is left astern the flood divides into two streams, one flowing northward into the bay of La Union, and the other north-eastward between Punta Sacate and Perez islands. Some care is required to avoid a dangerous reef extending southward $\frac{1}{2}$ of a mile from the south-west end of Punta Sacate; but which as it is never entirely covered presents no great difficulty. The channel here is but little more than $\frac{1}{2}$ a mile wide, and has a depth in the middle of 14 to 20 and 28 fathoms; having passed through this, the bay of La Union opens to view, and such an anchorage can be selected as may be convenient.

Farallones.—On the eastern side of the fairway to the bay of La Union, and just within the entrance to the gulf, is a dangerous group of rocky islets, named the Farallones, among which are some rocks under water. They lie with Monypenny point bearing East $5\frac{1}{2}$ miles, and the centre of Coseguina volcano S.E. by E., 9 miles; close to them all round is a depth of 8 to 10 fathoms.

Manguera.—Of the islands in the gulf of Fonseca this is most to seaward, it is consequently the first met with in the approach to La Union from southward. It is oval in form, and its extent from N.N.W. to S.S.E. is about $8\frac{1}{2}$ miles, its breadth being $1\frac{1}{2}$ miles. Its shores are cliffy, and its summit has an elevation of about 600 feet. Close to it on the south, west, and north sides, is a depth of 6 to 8 fathoms; but its eastern side has a sandy flat of 12 to 15 feet extending from it $\frac{1}{2}$ a mile, beyond which are soundings of 4 and $4\frac{1}{2}$ fathoms. A small rocky island, named Manguerita, lies about $\frac{1}{2}$ a mile from its south-east point; in the channel between is a depth of 10 to 18 fathoms.

Conchaguita is the name of the island situated 2 miles north-westward from Manguera. Its extent is $1\frac{1}{2}$ miles and its form is almost circular. This island rises to the height of about 500 feet, and may be safely approached on all sides except the north-east, whence a flat, 10 feet under water, extends halfway over to Perez island, and is succeeded by other shallows of similar depth. The channel to La Union bay is westward of this island, and has a depth of 6 and 7 fathoms; while the channel eastward of it, between it and

Manguera (that which is usually followed by vessels bound to Amapala in Tigre island,) has a depth of 11 to 9 fathoms.

Perez.—At $2\frac{1}{4}$ miles from Conchaguita in a north-easterly direction is Perez island, situated on the western edge of a $2\frac{1}{4}$ -fathom flat which extends from Conchaguita in a north-easterly direction to Disposicion island, and thence to the shore. Close to the western side of this island is a depth of about 4 fathoms, which increases to 9 and 10 fathoms towards the shore of Punta Sacate.

As Perez island is joined to Conchaguita by a flat of only 10 to 15 feet water, vessels approaching La Union bay (the eastern side of the approach to which is bounded by the islands and flat) must take care that they do not get too far eastward, especially at low tide. The flood hereabout sets north-eastward, and therefore has a tendency to carry vessels towards the flat.

Punta Sacate is the name of the island north-westward of Perez. It bounds the channel into La Union bay on the east side, and is of irregular shape. A reef, already mentioned, extends a short distance south-westward from its south-west point. Between the island and the shore northward of it, is no safe passage, almost the whole space being occupied by a mud flat which dries at low water. At a short distance from its east side is an inlet named Ohiquito.

Garova, Inglesera, Disposicion, Valasquez and Tigre are islands eastward of those just mentioned. Of these, Valasquez is the most extensive; it is close to the shore, and its summit has an elevation of 2220 feet. These islands are all, more or less, situated on the extensive shallows which prevail in the northern part of the gulf, and among them are many islets and rocks of which special mention need not be made. Disposicion is the same of the island off the south-west side of Valasquez, and about $1\frac{1}{2}$ miles north-westward from Tigre; it is recognisable from a distance by its rounded summits, of which the highest has a height of about 650 feet. Tigre the island most to seaward, requires some notice on account of Amapala, the port recently established on its north-west side, which, if the government gave proper encouragement to merchants, has conveniences for shipping sufficient to render it a place of some commercial importance.

Tigre has an extent of about 8 miles, and is almost circular in form. It is the highest of the islands of the archipelago just mentioned, as its summit has an elevation of 2590 feet. A bank of $2\frac{1}{4}$ fathoms extends 2 miles from its south-west side, in the direction of Manguera, leaving between it and that island a channel $2\frac{1}{4}$ miles wide, and about 4 fathoms deep; the east side of the island, in the direction of San Lorenzo bay, is so shallow that it is only for a short distance that vessels can get near it; its north side is unapproachable; consequently, it is only along its west side that an approach can be made to the port of Amapala, mentioned in the preceding paragraph. In this port vessels may anchor in 6 to 8 fathoms, green mud, and find excellent shelter from almost all winds; the ground is reported to hold extremely well.

If, when bound to Amapala, it be intended to use the channel between Conchaguita and Manguera, steer as much as possible midway between these islands, as thereby the deepest water will be preserved; the depth will be 9 to 11 fathoms. As the north end of Manguera is rounded, the second hill of the summit of Tigre should be brought on a N.E. by E. bearing and continued thus until the shore of that island is distant about $\frac{1}{2}$ a mile, when the channel to the port will become open; in this latter course the soundings will gradually decrease from 10 to $8\frac{1}{4}$ fathoms, on mud mixed with sand,—the lead should be kept going, especially when nearing Tigre.

The channel to Amapala is along the west shore of Tigre, between it and the extensive bank of 6 to 15 feet upon which are seated the islands Conchaguita, Perez, Inglesera, Disposicion &c., and which extends northward to the land. It is not quite $\frac{1}{2}$ of a mile wide, and in it are soundings of $4\frac{1}{2}$ to 8 and 10 fathoms; as the channel is so limited in breadth, the lead should be freely used, and especially because the edge of the bank is steep. When running through the channel, a little islet will be observed close off the west shore of Tigre, to which it is connected by a sand bank dry at low water; it is named Caracolita, and upon it are shrubs and a few trees. From this islet to Amapala the distance is about $1\frac{1}{2}$ miles, and the course is along the coast of Tigre, keeping off it a moderate distance; there is no danger but what is close in to the shore.*

Arrived at Amapala an anchorage may be selected at convenience, according to the ship's draught of water. A good berth will be at about $\frac{1}{2}$ of a mile from the sandy beach, with the flagstaff bearing S. 82° E., or a white house with three doors S. 89° E. From the anchorage the summit of Tigre will bear S. 41° E.; summit of Valasquez N. 17° E.; summit of Disposicion N. 58° W.; summit of Conchaguita S. 46° W.; and Amapala volcano S. 79° W.

The channel eastward of Manguera between it and the bank extending south-westward from Tigre, is also occasionally used, especially by vessels under 16 feet draught. From the little islet Manguerita, off the south-east end of Manguera, steer in a N.N.W. direction and keep the lead going to avoid getting on the bank extending from Tigre island, and as soon as Disposicion island bears N. $\frac{1}{2}$ W., steer for it on that bearing until Caracolita comes into view. When the latter bears N. $\frac{1}{2}$ E., the channel is open and may be entered and followed as before.

It is high water at Amapala on the days of full and change of the moon at 2h. 56m. The rise of the highest tide observed was 11 feet.

At the north end of Manguera the flood flows in an E.N.E. direction with a strength of about a mile per hour; the ebb, on the contrary, flows between Conchaguita and Manguera, S.S.W., at the rate of $1\frac{1}{2}$ miles. It is high water here on the days of full and change of the moon at 8h. 15m.; the rise of tide is about 10 feet.

The best time to leave Amapala is at the end of the flood and with a breeze from the land; no further instructions are necessary than to reverse those already given for entering.

Provisions of various kinds can be procured at the various ports in the gulf, but it is only at Amapala that meal, salt meat, wine, and oil can be obtained; this will, however, in all probability be only in small quantities, and occasionally supplies may fail altogether. Water can be obtained at Amapala from wells; it is said to be abundant and of good quality.

Mountains.—The mountains around the gulf of Fonseca are very conspicuous from the sea. Some have been mentioned in the course of the preceding remarks on the gulf, and it now only remains for us to allude to those named Viejo and San Miguel.

Towering above all other mountains eastward of the gulf, will be seen in clear weather the volcano Viejo which has an elevation of 5557 feet. This

* When approaching the port the direction and influence of the tidal stream must not be forgotten. The flood sets northward and towards the banks.

mountain cannot be mistaken for others, its height is so great, that it bounds the view in the eastern horizon; hence in clear weather it is a valuable landmark. When inside the gulf, in the vicinity of Manguera island, it will be observed over the bay of the Estero Real on a bearing of about S.E. by E. $\frac{1}{2}$ E.

San Miguel in about lat. $18^{\circ} 24'$, long. $88^{\circ} 5'$, is north-westward of the gulf of Fonseca. It rises to the estimated height of 6526 feet, and is a perfect cone having a very large base. Its summit (the crater) is almost a level, there being only a very slight concavity in the middle. The great elevation of this mountain causes it to be conspicuous above all the hills in its vicinity; when viewed from westward it appears detached from the surrounding land. It was in full activity in 1852, when its summit was frequently hidden by a white cloud.

The Coast.—From point Amapala, on the west side of the gulf of Fonseca, the coast trends in a westerly direction about 26 miles to port Jiquilisco, and is for a few miles fronted by a sandy beach, which is succeeded for a further distance of about 10 miles by a bolder coast, cliffy in some places; this ceases on the bearing of San Miguel mountain N. 18° E., and is followed by a low shore as far as port Jiquilisco. These sandy beaches give a very deceptive appearance to the land, especially at sunrise and sunset, at which times it does not seem to be at the distance from the vessel that it really is, and the surf also apparently breaks further from the coast than it actually does; hence it must be approached with extra care, and especially too as it has not been surveyed, and is almost unknown. The soundings from a distance of some few miles in the offing are believed to decrease gradually to the shore, and it is stated that vessels may anchor off the coast if overtaken by a calm, which it is perhaps most prudent to do,—the currents being variable, sometimes to eastward and sometimes to westward, with a strength of about $1\frac{1}{2}$ miles an hour.*

A dangerous shoal upon which is a depth of about 12 feet, has been reported as existing off this part of the coast, in lat. $18^{\circ} 2'$, long $88^{\circ} 19'$ (approximate). According to the statement, it is 8 miles long in a N.E. and S.W. direction, and from its centre San Miguel volcano bears N.N.E. Two vessels are asserted to have struck on it, at an estimated distance from the shore of about 10 miles. If it really exists in this position, it will be in the direct track from the gulf of Fonseca to Acajutla.

It would perhaps be imprudent to act as if this danger had no existence when one considers the difficulty that is sometimes experienced in discovering sunken rocks, but the following certainly throws discredit upon its existence in the position stated. M. Lapelin of the French vessel *Brillante*, 1852, says "From the time that we were near the extreme point of the bar of Jiquilisco until we got San Miguel mountain on the bearing of North (*true*), we steered East to E. by S., at first running along the breakers and afterwards along the coast at the distance of 2 miles, and had constantly soundings of $8\frac{1}{2}$ fathoms, fine sand, which decreased to $7\frac{1}{2}$ fathoms when we were opposite two small rivers. From the latter to point Amapala we steered on a line oblique to the coast, a distance of about 12 miles in an E.S.E. direction, and had soundings gradually increasing from $8\frac{1}{2}$ fathoms to 27 fathoms; thence approaching the land again the depth decreased until we obtained $4\frac{1}{2}$ fathoms

* Voyage of the *Sérieuse*, in the *Annales Hydrographiques*, Vol. 10.

on the bank surrounding the coast of Amapala. Our experience is therefore contrary to what has hitherto been considered, that it is dangerous to approach this part of the coast, and that the soundings off it are very uneven, and this has been confirmed by the experience of M. Cosnier of the *Sérieuse*. To this I would add a much more general remark, that until a complete survey of this coast is made the regularity of the soundings off it make them the best guide for approaching the coast of Central America, with the exception that in a few places it will be prudent not to approach the land to a depth of 16 or 18 fathoms, because then the vessel will be too close in. I believe it can be admitted as certain that, from point Remedios (Acagutla) to point Amapala, no danger will be encountered while the depth of 11 to 8 fathoms is maintained."

PORT JIQUILISCO, named also *Espíritu-Santo* and *Triunfo de los Libres*, consists of a bay situated in about lat. $10^{\circ} 10'$, long. $88^{\circ} 18'$. It has not been examined, and the few particulars we possess of it are not of a reliable character. Its entrance is said to be intricate and much obstructed by sand-banks, upon which the sea breaks heavily; and, within the entrance are some islands, one of which, named, Pajaros, divides the bay into two parts. The average depth in the channels is stated to be about 8 fathoms; hence, if this be correct, there is water sufficient for large vessels. When intending to enter, it will be prudent to send a boat ahead to sound the passage, should it so happen that a pilot cannot be obtained.

M. Jamin of the French ship *Genie* wrote thus a few years ago "On the evening of the 25th January we got under way from the river Lempa, with a good S.S.E. breeze, which enabled us to run along the coast in about 8 fathoms, and at sunset we observed some breakers opposite us which appeared to extend a considerable distance from the land; we then anchored in about $9\frac{1}{2}$ fathoms, soft mud. The next day we got under way again, and it was then easy to see the breakers, which extend across the Estero in the form of a horse-shoe, in such a manner that the bay can only be entered by going round them; the sea broke over them with considerable violence, but there are places among them where in fine weather there are no breakers, which might consequently be easily traversed by boats.

The depth in the deepest part of the channel at low water is 15 feet; the rise is about $9\frac{1}{2}$ feet. It is therefore possible for vessels of considerable tonnage, to get within the breakers, where there is a much greater depth of water, with the exception that in two or three places there are some small banks; these may, however, be easily avoided.

The ebb current leaving the Estero forms eddy streams in which there is a good depth of water, and these eddies are also to be seen in the deepest places on the reef; hence the position of the navigable channel is well indicated. The current flows in an opposite direction with the flood,—at the rate of 2 or 3 knots at full and change, when the bar is very dangerous, except at the time of high water."

M. Lapelin of the French ship *Brillante*, 1852, says "The coast between the river Lempa and port Jiquilisco is low and wooded, but the beach, which in the neighbourhood of the river is of very white sand, becomes here of a well determined gray colour. The soundings off it at the distance of a mile are regular, the depth at that offing being 7 fathoms, on a bottom consisting of sand covered with a very tenacious slimy mud, good for holding; apparently there are no sunken dangers. Near Jiquilisco, the coast (similar in appear-

ance to that immediately westward of it, being backed by some wooded hills, and fronted by a beach so low as frequently to be hidden by the heavy surf that breaks on the bar) is intersected by several rivers. The bay of Jiquilisco, unlike what may be remarked of the rivers Lempa, Paza &c, has not about it large mangrove trees so conspicuous with their white trunks, but clumps of thickets of a dirty pale green colour, or great bushes comparatively leafless. I regret much that a long line of breakers in the form of a horse-shoe, which fronted the half drowned lands prevented an approach to the coast sufficiently near to permit me to determine the position of the bay with precision, nor was I more fortunate in finding the channel mentioned by the commander of the *Genie*, I am obliged therefore to limit myself to the following remarks:—San Miguel volcano bearing N. 27° E. leads to the horse-shoe breakers, which are situated in lat. 13° 8', long 88° 39'.* From these breakers the volcano San Vicente bears N. 42° W., that of San Salvador N. 58° W., that of Virola N. 8° W., and that of Coseguina East. (Variation 7° 40' E.)

We approached the breakers as near as $\frac{1}{2}$ a mile, coasting them from West to East, and had never less than 6 fathoms. When we were so far from them as a mile to $1\frac{1}{2}$ miles, although the colour of the water was a very marked yellowish green, we had soundings of $7\frac{1}{2}$ to $8\frac{1}{2}$ fathoms. During our running survey we found the bottom very even, and the neighbourhood of the bar was always indicated by a gradual decrease of the soundings. The bottom consisted of a very fine gray sand, which offered but little resistance; hence if there is an intention to remain here for a short time, anchorage should be sought at about $1\frac{1}{2}$ miles westward of the bar, where is slimy mud mixed with black sand excellent for holding."

RIVER LEMPA.—The mouth of this river is about 15 miles westward from port Jiquilisco, and is situated according to M. Lapelin in lat. 13° 12' 20", long. 88° 51'. From its bar, which extends out a mile or $1\frac{1}{2}$ miles from the land and is said to be almost impassable, the volcano San Salvador bears N. 50° W., that of San Vicente N. 16° W., and that of San Miguel N. 60° E. On the left bank of the river are or were some fishermen's huts.†

LIBERTAD.—From the river Lempa to Libertad, a distance of about 80 miles, the coast is believed to be free from outlying sunken dangers, and it is said that there are regular soundings off it, which decrease gradually from the depth of 50 fathoms. At a mile from the land the average depth is 7 fathoms, on fine sand and mud. The land, bordered with a belt of white sand, consists of an extensive plain, from which rises in the distance the volcanoes San Vicente and San Miguel; these are of great altitude and visible from a distance of many miles.

Port Libertad is an open roadstead, with no shelter whatever. The town (‡) consists merely of a few houses or huts, attached to which is the custom-house

* All the longitudes of M. Lapelin are about 10 miles westward of those of Sir E. Belcher, R.N., which have been adopted in the English Admiralty charts.

† The Lempa is the largest and most important river in the state of San Salvador. Notwithstanding its great length and breadth and the immense quantity of water it contains, it is not navigable for more than 8 leagues from its entrance,—that is to say with river steamers. Further up, owing to the numerous sand banks and rapids, navigation is almost impossible. Sand banks also abound in the part most navigable, and render the entrance very difficult. The mean velocity of the current of the river is 4 to 5 miles per hour.

establishment. But very few, if any, supplies can be obtained from it, and the only reason why it is dignified by the name 'port' is, that it is the nearest place on the sea-board to San Salvador (the capital of the state) which is frequented by vessels, and from which it is distant about 16 leagues. Water is obtained with some difficulty, from the little river Quelama, situated at rather less than $\frac{1}{2}$ a mile westward from the houses. The port can be considered a safe roadstead only during fine weather, or when the wind is from northward; it should not be visited from July to October.

When bound to port Libertad, vessels from southward should sight the volcano San Salvador, and steer with it bearing N. $\frac{1}{2}$ E., as it will then lead them to the roadstead. If from eastward or westward, a better course cannot be adopted than to follow the coast at an offing of 5 or 6 miles, supposing the weather to be favourable for so doing, there being no objects immediately over the town sufficiently conspicuous to be visible from a distance.

If approaching the port directly from southward, soundings of 27 to 25 fathoms, mud, will be obtained at about 8 miles from the land, which thence decrease gradually to the beach. A nearer approach will bring into view a large white warehouse covered with tiles, having on its east side a flag-staff, and on its west side a large white house; the house is perhaps more conspicuous than the warehouse. And, when still nearer the land, the cottages thatched with palmetto leaves will rise into view.

The depth at a mile from the land is about 8 fathoms, muddy sand. Although this depth is perhaps considerable for some merchant vessels to anchor in, it is a better anchorage than nearer the shore, the bottom closer to the beach being not so good in quality, it is however a little too far out for loading and unloading cargo. Near the beach the bottom consists at first of fine sand, and afterwards of pebbles or gravel.

The port was visited in 1837 by Sir E. Belcher, R.N., who has remarked, "One would naturally expect from the title, 'port of Libertad,' something pretending to a bay, or a deep indentation; but a straight sandy beach between two slightly projecting ledges of rock, about 1 mile asunder, forms the *playa* of Libertad; it is law and interest only that have made it a port.

At times the bay is smooth, but the substratum at the beach being of large smooth boulders of compact basalt, the instant the surf rises, they are freed from their sandy covering, and a dangerous moving stony bottom left, on which our boat grounded. We were informed that it is generally violent for three or four days at full and change, which corresponded with our visits.

The rollers which set in on this beach curl and break at times in 4 or 5 fathoms, at least a $\frac{1}{2}$ of a mile off. Those within, which are the most dangerous, are caused by the offset, or efflux.

The sand beach is composed chiefly of magnetic iron sand, the dried superstratum, about one inch in thickness, caking in flakes free from admixture.

The anchorage is uneasy, and, I should think, unsafe, and should be avoided near the full moon. Sudden rollers come in, which are apt to snap chain-cables, unless with a long range.

Poultry, bullocks, &c., are to be obtained, but, compared with those of San Salvador or Realejo, the prices are exorbitant. Bullocks can only be embarked in one of their bongos."

The Coast.—From port Libertad to Acajutla the distance is about 28 miles, along a coast believed to be free from any outlying sunken dangers,

and supposed to have a bank of soundings from it to the distance of 10 or 15 miles. At from 1 to 2 miles from the beach the depth has been ascertained to be 13 to 16 fathoms, muddy sand. At first the land consists of an agglomeration of very irregular hills or mountains covered with trees or varied with reddish coloured spots of great barrenness, which terminate at the sea in cliffs having at their base a beach of shingle or gravel; in the vicinity of Acajutla the country is less high, more level and well clad with trees.

The volcanoes Virola, San Vicente or Sacatecoluco, and San Salvador, situated some miles inland, are a great assistance to vessels bound to ports Libertad and Acajutla, as they are visible from a distance of many miles at sea.

Virola, situated in lat. $18^{\circ} 26'$ between the volcanoes San Miguel and San Vicente, consists of high lands among which can be distinguished a mountain with many peaks as well as a cone having the appearance of an old volcano; this cannot be seen from a great distance.

San Vicente in lat. $18^{\circ} 35'$, long. $88^{\circ} 59' 6''$ (M. Lapelin F.I.N.) has an elevation of about 6900 feet. It rises in the form of a truncated cone, the summit of which, viewed from eastward or westward appears cleft, one summit being more rounded than the other.

San Salvador in lat. $18^{\circ} 48' 30''$, long. $89^{\circ} 21' 21''$ (M. Lapelin) has an elevation of about 6480 feet, and can be seen when at the distance of fully 60 miles from the land. Viewed from the sea it appears behind the mountain chain in the form of a very large mountain, with a flat summit, in shape not unlike the back of a tortoise. At its extremity is a peak rather more lofty than itself.

ACAJUTLA.—The bay of Acajutla is formed on the south side by point Remedios, which is sufficiently high to be seen from a distance of 10 or 12 miles, and on the north side by a low sandy coast which trends in a N.N.W. direction from the town. It is an open bay, exposed to all winds from westward; these occasionally send in a very heavy sea, hence it is not considered a desirable anchorage, especially in winter. Point Remedios, conspicuous from the offing by its dark colour, has at its base some rocks above and under water, which extend out about a mile; as this reef is steep, with a depth of $8\frac{1}{2}$ to 5 fathoms close to it, more than ordinary care is required when entering the bay from southward or south-westward.* The soundings at about 4 miles from the shore are 12 and 18 fathoms, thence gradually decreasing to 5 fathoms immediately off the houses,

From point Remedios the coast has a direction of N.N.W. for about $8\frac{1}{2}$ miles to Acajutla, and consists of cliffs intersected with little beaches of white sand. At the end of these cliffs is the landing place, the town itself being situated on the summit of the cliff; the town is but a small place defended by a battery, and conspicuous among the huts will be seen a tiled building occupied as a custom-house, near which is a flag-staff.

Acajutla is one of the principal ports of San Salvador. At about 4 leagues from it, in the interior, is the town of Sonsonate, situated at the foot of the volcano Isalco; this town has a population of 5000 to 6000.

* The reef from Remedios point is represented in the Admiralty charts Nos. 587 and 2148, on the authority of a Spanish M. S. of 1794, as extending out 8 miles in a S.W. $\frac{1}{2}$ S. direction. In the absence of a proper survey of the coast we are unable to say which statement is correct.

When bound to port Acajutla it is recommended to get sight of the volcano Isalco, and bring it to bear N.E. by N., as that bearing leads directly to the anchorage. The mountain is situated about 12 miles from the coast, is 4972 feet high, and behind it are others of much greater altitude; it is easily recognised, for although there are peaks in its neighbourhood very similar in appearance, as it is an active volcano, the column of smoke and steam constantly ascending from it and the frequent eruptions of molten lava, render it conspicuous during day and night,—it is also not of sufficient height to be so frequently hidden by clouds as are the more lofty mountains in the interior. From these circumstances it is a very useful landmark to vessels seeking the ports of Istapa, Acajutla and Libertad.

The usual anchorage in fine weather is in 7 to 10 fathoms, sand, mud and gravel, which will be at about 2 miles from the shore, with mount Isalco bearing from N. 83° E., to N. 86° E. and point Remedios S.S.E. to S.E. by S. During winter, when the swell of the sea is very great and the winds from S.S.E. to S.W., occasionally very violent, it will be prudent to anchor further out, in not less than 11 fathoms with point Remedios bearing about S.E., and mount Isalco N. 86° E.*

A good mark when running for the anchorage is the flag-staff in one with the large door of the custom-house store. If it be necessary, vessels may tack without hesitation as there are no sunken dangers, with the exception of those already mentioned around point Remedios, and the soundings are an excellent guide.†

The anchorage cannot be considered convenient on account of the difficulty of loading and unloading cargo; it is however safe in fine weather. Unless circumstances compel a visit it is as well to avoid it during the months from July to October, because at that time very heavy seas are sent in by strong winds from seaward. Nor, can the holding ground be considered good, for the *Heroine* when anchored in 16 fathoms mud, dragged both her anchors although the chains were 142 fathoms long. When seeking the inner anchorage, the flag-staff should not be brought northward of N. 60° E., or the anchors may be cast upon beds of rocks which may either break them or cause them to be lost altogether.

It is high water on the days of full and change of the moon at 2h. 35m. The rise of tide is about 9 feet. During the fine season, the set of the current is generally E.S.E., at the rate of $\frac{1}{4}$ of a mile per hour.

Water is obtained at Acajutla either from the river Grande, a little westward of the anchorage, or from a cascado which falls upon the beach. The quality of the latter is very good, but as the brook which furnishes it passes through the town and is dammed up to ensure a sufficient supply of water for the inhabitants it is necessary to obtain permission before taking it.

Supplies of fresh provisions, as well as of cattle, wood, sugar, &c. &c., can be obtained at the town, at reasonable prices.

* The following bearings from the anchorage were taken by the French surveying vessel *Brillante* in 1852, Agua volcano N. 41° 49' W.; left summit of the mountain Escalvos N. 82° 35' W.; middle of the Table of Apance N. 10° 19' E.; Isalco N. 42° 48' E.; point Remedios S. 82° 9' E.; and the flag-staff N. 72° 27' E. (Variation 7° 11' E.)

† The heavy seas which break upon the beach of Acajutla have formed a bar, which although generally not so bad as that at Istapa, 56 miles westward of this port, is larger and perhaps more dangerous. It requires some address to effect a landing.

Acajutla bears the reputation of being extremely unhealthy especially during the winter months; perhaps there is not a more unhealthy place on the coast of Central America.

M. Marie * says of this port:—"If you bring Isalco to bear N.E. by N., and steer in that direction, you will make this port. The custom-house, magazines, and the huts of the village are situated on a height that overlooks the beach, but are not distinctly visible, being surrounded by trees, yet, from the distance of 4 miles, the harbour flag-staff and a shed having a tiled roof situated close to the sea, can be distinctly seen. The port is also recognised by being situated at the termination of a range of rocks, and where the beach is sandy. The following are good marks for anchoring in summer, in 8 fathoms, mud, point Remedios S.E.; the flag-staff on with the inner angle of the custom-house store; and mount Isalco N.E. by N.:—in winter, in 12 to 14 fathoms, mud, mount Isalco N.N.E.; point Remedios S.E. by E.; and the flag-staff in one with the west wall of the custom-house store.

Landing at this place is difficult, and it is even imprudent to attempt to pass the breakers in a small boat. It is requisite to have a good whale boat, which, to prevent accidents, should be manned by a competent crew; and a landing should not be attempted when the sea is rough."

Acajutla was visited in 1859 by H.M.S. *Havana*, Captain T. Harvey. "Starting from San José de Guatemala on May 24th, we worked down to Acajutla. Between these places a ship may stand in safely by the lead, as it shoals gradually and regularly to 10 and 12 fathoms at 8 miles from the shore. In the afternoon of the 26th we anchored at Acajutla, with point Remedios and the shoal from it sheltering us from south-eastward. Here we found a substantially built wharf, at which there is generally a fair landing, although at times the surf is such as to prevent any approach. Merchant ships discharge and receive cargo by their own boats. On the 27th the breakers on the shore were so trifling that our cutters landed on a wooding expedition in parts of the bay without the slightest difficulty; but on the 29th the surf was so heavy that it was extremely hazardous even at the wharf, and four hours were occupied in watching opportunities to embark supplies. Beef, stock, vegetables and fruits may be obtained in any quantity from Sonsonate; but two days' notice must be given to secure any considerable amount. The pier, happily, is provided with cranes, which we had to use in getting off bullocks. We anchored in 12 fathoms with the landing place bearing N. 55° E. A vessel should not stand nearer to Remedios reef than the depth of 20 fathoms, unless with a good breeze and clear weather. The volcano Isalco was burning during the whole of our stay,—no lighthouse gives a better light. This volcano bearing N.E. by N., is a good mark for the port."

The Coast.—From Acajutla to Istapa the distance is about 56 miles in a W.N.W. direction. The coast consists of a beach of greyish coloured sand, backed by a well wooded shore, interrupted in a few places by some rivers among which are those named Grande, Caota, Santiago, Paza and Esclavos; the entrances to these are generally indicated by the white trunks of mangrove

* Renseignements sur le Centre Amérique recueillis pendant le voyage de *La Mélanie*, 1828.

trees, but none are of importance. The land at a few miles from the coast rises into mountains, among which will be noticed the Table of Apaneca, 5709 feet high, situated a little westward of the meridian of Acajutla, and the Morro de los Esclavos with its rounded summit, the elevation of which is estimated to be 4929 feet; between this latter and the meridian of Istapa are mountains of even greater altitude.

The surf upon all this coast is extremely heavy, especially when a strong wind has prevailed a few days from southward. It is believed that no sunken dangers exist off it, and the soundings obtained indicate great regularity in the bottom, which consists apparently of muddy sand. The depth at about $\frac{1}{2}$ a mile from the beach is 18 fathoms, and at from 1 to 8 miles 22 to 28 fathoms; in the neighbourhood of Acajutla the bottom is not so steep. The usual direction of the current appears to be from West to East, following the coast, at the rate of a $\frac{1}{4}$ to 1 mile per hour.

ISTAPA.—Istapa is a port of very little commercial importance as the village in 1852 consisted merely of huts used for quarantine purposes. It is an open roadstead, exposed to all winds from southward, which as already noticed occasionally prevail with considerable strength, when they send in a very heavy sea. The usual anchorage is at $\frac{1}{4}$ a mile from shore, in 16 to 18 fathoms, on a bottom of muddy sand, with the flag-staff bearing about N. by E. The *Brillante* anchored here in 1852, with the volcano Agua bearing N. 8° 21' W.; right peak of Fuego N. 16° 31' W.; volcano of Tajumulco N. 84° 58' W.; left summit of Pacayo N. 12° 48' E.; left summit of Esclavos N. 79° 16' E.; and the flag-staff N. 8° 12' W., (Variation 7° 30' E.) The depth at 4 miles from the land is 20 fathoms, mud, whence it gradually decreases to the beach.*

When bound to Istapa from *eastward* or *westward* the land for a few leagues from the port may be coasted at the distance of 8 or 4 miles, as at that offing it is free from any known sunken reefs. Making the anchorage directly from *southward* the high lands in the interior are very useful as marks, for the volcanoes Agua, Fuego, Atitlan and Tajumulco, are visible when at fully 50 miles from the coast, and those of Pacayo and the Morro de los Esclavos at more than 80 miles.

Agua rises in the form of a perfect cone to the height of 13,468 feet, and is apparently connected on its west side to Fuego volcano by means of a ridge of considerable altitude; the latter mountain has two peaks at its summit, of nearly equal size and appearance, one of which is always surmounted by a panoply of smoke;—the height of this volcano is estimated to be 14,000 feet. It is only in very clear weather that the lofty volcano westward of Fuego can be distinguished; it is either Atitlan or Tajumulco; if the latter, it has a height of about 11,480 feet, and its summit forms three peaks, one of which, the middle and highest, is active. Pacayo, eastward of Agua, is 9594 feet high, and easily recognised by its jagged and irregular summit, which conveys the idea of a crater fallen in. The Morro de los Esclavos has been previously described.

* We believe that Istapa has been closed as a port for foreign vessels since 1853. The anchorage is extremely inconvenient, and unhealthy, especially during winter.

+ Tajumulco is situated in lat. 14° 36', and is about 28 miles westward from Istapa; Atitlan is in about lat. 15° 12'.

Of the mountains just mentioned, Pacayo and the Morro de los Esclavos, are generally visible when the summits of the others are hidden by clouds; hence they are usually more serviceable as marks for the port.

If mount Agua is brought to bear N. $\frac{1}{2}$ W., Fuego N. by W. $\frac{1}{2}$ W., or Pacayo N. by E., it will lead directly to the port. When on any of these lines of direction the depth at a few miles from the land is 30 to 25 fathoms, whence it diminishes gradually to the beach. A low sandy shore, covered with wood, at last comes into view; among the trees will be seen some huts, and soon afterwards the flag-staff and customs establishment. In the event of the volcanoes being hidden by haze, it is recommended to make the land between Istapa and Acajutla, and afterwards to steer westward in a depth of 16 to 18 fathoms; as soon as the flag-staff comes into view it may be run for, keeping in the same depth, and a berth selected at convenience. If having to load or unload cargo, it is considered desirable not to anchor eastward of the bearings mentioned in the preceeding paragraph, because the current then assists the boats in regaining the shore.

Istapa is visited throughout the year, but the bar is so bad during July, August and September, as frequently to prevent a landing; hence vessels should if possible avoid the port during those months. An additional reason for this recommendation should also be mentioned, namely, that the bottom at the anchorage is at this season so much influenced by the heavy seas sent in by the strong on-shore winds, that much dependence cannot be placed upon the anchor holding. The coast being very steep, the bar is not far from the beach. With a northerly wind and at the period of full and change of the moon the bar is frequently impracticable.

The current follows the line of coast, flowing from West to East at a rate of from $\frac{1}{2}$ to 1 $\frac{1}{2}$ miles per hour.

Water can be obtained at Istapa in small quantity, and of very inferior quality. Previous to the year 1853 (see the note * page 75), provisions of various kinds could be obtained at reasonable prices, but many kinds had to be procured from Guatemala.

SAN JOSE.—From Istapa the coast trends about 8 miles in a westerly direction to San José de Guatemala or Zapote, but which is better known under the name briefly of San José. It is an open roadstead, but little superior to that of Istapa (by many shipmasters considered to be inferior to it), affording no shelter whatever, and as an anchorage subject to all the inconveniences of that port. A strong wind from southward sends in so heavy a sea that at times a landing cannot be effected, and at the same time disturbs the bottom so much that the anchors frequently drag; hence it can be considered a safe anchorage only during the fine season. Communication with the shore is made with the *andarivel*.

The usual anchorage is about $\frac{1}{2}$ a mile from the shore in 16 to 10 fathoms, on fine sand of very indifferent tenacity. Very large vessels anchor further out in 20 to 16 fathoms. The French surveying vessel *Obligado* anchored in 1854 with the following bearings, Agua volcano North; Fuego volcano N. 14° W.; Pacayo volcano N. 15° E.; Atitlan volcano N. 36° W.; and the flag-staff N. 21° W., (Variation $8^{\circ} 45'$ E.)

Approaching San José from eastward or westward the land for a short distance from the port may be coasted at a moderate offing, as it is believed to be free from sunken dangers, but it must be borne in mind that as it has not been surveyed, more than usual care should be exercised; giving the shore a

berth of 2 or 8 miles will be as close to the beach as a prudent shipmaster should get, and he will then have soundings of 22 to 15 fathoms,—if this distance be maintained the land breezes will be of considerable advantage. In the event of the wind prevailing from S.W. or W.S.W., it will be safe in the boards to get as close to the land as 1 mile, in soundings of 10 or 11 fathoms, but not nearer. The lead should be frequently hove, the soundings being an excellent guide, as they shoal gradually. If the sea wind fail without being succeeded by a strong land wind, it is recommended to anchor for the night, that the progress gained during the day may not be lost.

If the port be approached directly from southward, the volcano Agua should be brought to bear North, or that of Fuego N. 14° W., as either of those bearings will lead to it. When these mountains are hidden by haze, it is recommended to make the land about Istapa, and thence approach the roadstead until the flagstaff of the custom's establishment bears N. 20° W., when the anchor may be cast in the depth most convenient.

Although the usual supplies for shipping can generally be obtained at San José in small quantities, reliance should not be placed upon getting them, as the village consists of but little else than a few huts inhabited by the staff of the custom-house; even water (of good quality) has to be fetched from some distance in the interior.

The winds at San José, as on other parts of the coast of Central America, are, from November to May, generally from S.S.E. by South to West, from 10h. A.M. to 8h. or 9h. P.M., a short interval of calm then follows, which is succeeded by a light wind from North to N.E. From June to November a vessel should not anchor here unless at a distance from the shore sufficient to permit her to beat off with facility when the winds are from South and S.W. which often blow with very great force and raise a very high sea. During this season the bar is often impassable even by the andarivels.

In the narrative of the voyage of H.M.S. *Havana*, Captain T. Harvey, R.N., 1859, the following remarks upon San José occur; it should be premised that the port was approached from westward. "On May 11th we found ourselves inshore looking for Istapa. The Guatemala peaks could not be seen, and the shore showed us nothing but one unbroken line of beach and trees, with a heavy surf, but in the evening we had the satisfaction of distinguishing Agua, the east centre peak of the range. The next morning, on standing in, we observed three vessels at anchor to the westward, and running down to them, came-to in 18½ fathoms under the belief that we had reached Istapa. The first visitors informed us of our mistake, and that we were really at San José de Guatemala. The place is utterly undeserving the name of a port, although we found three vessels at anchor there, and a large French ship arrived as we left, it being the only landing place for goods for Guatemala. The anchorage affords no shelter whatever; the surf has its full force. The only way a landing can be effected is by means of a surf boat, and even this was capsize four times during our stay. The town of San José consists of some half dozen grass huts, which with the flagstaff, cannot be distinguished beyond 5 miles from the shore. The best marks for the port are, therefore, the Guatemala peaks, which are generally visible at dawn. From our anchorage the true bearings of these peaks were as follows:—Agua N. 6° 28' E.; Fuego N. 7° 8' W.; Pacayo N. 28° 26' E.; and Tajumulco N. 28° 20' W. We were distant about 8 miles S. 27° E. from the flagstaff, and in

lat. $18^{\circ} 58' 35''$, long. $90^{\circ} 44' 20''$. * Variation $8^{\circ} 36' E$. The current generally sets to the westward, and yet a continuation of westerly winds will alter it."

The Coast.—From San José the coast trends north-westward and westward 270 miles to the entrance of the great lagoons of Tehuantepec, named the Boca Barra. Of all this coast we possess no information whatever, and we believe that it contains no ports that are frequented by foreign vessels. It is said to be low and sandy, and to contain many lagoons which communicate with the sea by means of narrow channels navigable only by boats. The mountains behind this low flat shore rise to a great height, and many of the volcanic peaks are sufficiently lofty to be visible when at the distance of 40 miles from the land.

TEHUANTEPEC LAGOONS.—These lakes extend into the land about 12 miles, and have an extent east and west of nearly 40 miles. They are, we believe, useless for the purposes of navigation and are mentioned chiefly because at a few miles westward from them are the thriving towns of Juchitán and Tehuantepec, having populations respectively of 6000 and 18000; at the latter town are sixteen churches, and a college was established in 1850. The entrance to the lakes, Boca Barra, is in lat. $16^{\circ} 18'$, long. $94^{\circ} 45' 80''$, and is too shallow to admit vessels even of moderate size. On the bar breakers constantly prevail, which add greatly to the difficulty experienced in running in. Within the entrance are numerous shoals of shifting sand.

The soundings immediately outside the Boca Barra are $2\frac{1}{2}$ to 4 fathoms, fine clayey sand. The current from the lakes through this boca, on 9th Nov. 1850, flowed at the rate of $7\frac{1}{4}$ miles per hour.

From the Boca Barra the coast trends westward about 22 miles to the bay of Ventosa, and is throughout low and sandy, consisting for the greater part of this distance of a narrow beach separating the Tehuantepec lagoons from the sea. The soundings at from $1\frac{1}{2}$ to 2 miles from it are $5\frac{1}{2}$ to 8 fathoms, on clayey sand.

VENTOSA BAY is situated in lat. $16^{\circ} 10\frac{1}{2}'$, long. $95^{\circ} 9'$, or at about 12 miles south-eastward from the town of Tehuantepec. It is not very extensive, being only 2 or 8 miles across; but it presents some advantages which the other bays on this coast do not possess. Although open to southward and eastward, vessels may safely ride at anchor in it, as the holding-ground is excellent, and the depth of 6 and 7 fathoms which prevails over almost all the bay, is very convenient. The soundings are gradual from 8 fathoms at the distance of 100 yards from the beach, to 7 and 8 fathoms at 1000 yards; and the anchorage is on a muddy bottom extending E.N.E. from Morro point, its south-west extremity. The western shore consists of low sandy land, enclosing some lagoons, which receive the waters of the river Tehuantepec. This bay has been proposed as the Pacific termination of a railway across the isthmus of Tehuantepec from the Gulf of Mexico, the construction of which is reported to present no difficulties of greater magnitude than an engineer of ordinary ability would be able easily to overcome.

Mr. Temple says "I am of opinion that Ventosa bay is not only the best, but the point for a harbour on the Pacific coast of the isthmus. It is a far

* The observations of the French surveying-vessel *Obligado* in 1854 place the port in lat. $18^{\circ} 54' 38''$, long. $90^{\circ} 56' 36''$. It has been already noticed that all the French positions on this coast are 10 or 12 miles west of the English.

better and safer port than either Valparaiso or Monterey; ports in constant use the year throughout. I speak from personal observation, as well as from an examination of the several charts, and the similarity of outline has suggested the comparison; for, although the indentation of the coast is possibly a little deeper at each of these places than at Ventosa, yet they are both open to northward, and as the general trend of the coast is nearly north and south, the prevailing gales blow directly along shore and into these harbours, creating a heavy swell, and often forcing vessels to slip and go to sea for safety: whereas, at Ventosa the trend of the coast is east and west, so that the "northers" blow directly off-shore, and create no swell whatever. The danger being from the sudden strain brought upon a cable by the surging of a vessel in a sea-way, and not from the steady strain caused by the wind, it follows that "northers" may be disregarded in an estimate of the safety of this anchorage, as was satisfactorily shown in the case of the *Gold Hunter*. But "northers", although frequent during the winter, and seldom occurring at other seasons, are the only gales that blow in this region. The southerly winds, characteristic of the summer and autumn, are said to be nothing more than thunder squalls of short duration, and incapable of raising a sea. Even the fresh and steady sea-breezes that prevailed during the latter portion of our stay at Ventosa bay were unaccompanied by any increase of swell."

The following is an extract from the Report on Ventosa bay by the engineer, P. E. Trastour, Esq. :—

"The western extremity of the bay is formed by the Cerro Morro, an isolated rock of oblong shape, rounded at the summit, about 150 feet high and 2600 in circumference; and a little more to the south by a pointed rock, separated from the former by an interval filled in with sand, and forming an angular projection into the sea, known under the name of the point of the Morro.

On the west, the point of the Morro is contiguous, by its base, to an uninterrupted series of rocky hills, lining the beach and covering an extent of 6000 feet. They cut perpendicularly the flank and rear of an agglomeration of moderate heights, somewhat rugged and precipitous at their summits, and forming together a thick cluster of granitoid structure disposed in strata wherein feldspar and amphibole are predominant. It is the last link of that chain which, detaching itself at the north-west from the cordillera of Oaxaca, descends by an irregular series of decreasing heights, passes to the north of Huamelula, turning it at the south-east, and terminates at the Pacific ocean, where it separates the bay of Ventosa from the bay of Salina Cruz.

The sandy strand of Ventosa commences at the foot of the lateral portion of the Cerro Morro, facing the east, and describes from the south to the north-east an arc nearly $2\frac{1}{2}$ miles in length; then takes an easterly and almost rectilinear direction, but drawing a little towards the south, extends on about 6 miles further, where it runs into the sea; after which it turns back again abruptly and inclines towards the north, though trending all the while in an easterly direction.

From the summit of the Cerro Morro looking towards the east, the beach loses itself in a distant horizon, and unfolds to the eye a long belt of white sand from 200 to 800 feet wide, terminating inland by a vast plain, scarcely broken upon by the isolated hillocks of Huazontlan. This plain, of a slightly undulating nature, is composed of sand, clay, and vegetable earth. It is covered with trees of middling size, which grow both thinner and smaller, as

one advances towards the east. But in the direction of the cordillera which separates the isthmus into two parts, north and south, this alluvial country is generally flat, presenting at rare intervals detached heights, easily avoided in the planning of a road of any character whatever, offering to the view fields of corn, indigo, sugar-cane, palm-trees, nopals, bananas, orange-trees, cocoanut-trees, and plants of which the vigour and variety bear witness to the great fertility of the soil.

The sandy beach of Ventosa itself is cut by lagoons of little depth, having several outlets into the sea, and by the bed of the Tehuantepec river. At the time of the periodical overflow, this current flows over a low country before reaching the Pacific ocean, in which it then empties itself, not only by its mouth, but also by means of those lagoons, its sole outlets during the dry season.

The volume of the water of the river is subject to very great variations in the course of the year. In the rainy season it reaches 12 feet depth, in years of an extraordinary character.

The rainy season usually commences in the month of June and finishes in the beginning of October. The isthmus, in general, offers as many different climates as localities, differing from one another by their situation, the nature of their soil, the atmospheric phenomena, and the position of their mountains in respect to the cardinal points.

Advantages.—The immense basin of Ventosa presents a safe and commodious harbour to vessels of all sizes. Closed at the west by the heights of the Morro, it is open at the south and east. This configuration of the bay allows vessels to have ingress and egress, irrespective of the quarter from which the wind blows. Throughout its great extent, and on entering it from the sea, no shoals are to be met with; everywhere a good anchorage is to be found. The bottom is of compact sand, and a great proportion of it is mixed with clay.

The depth is almost regularly graduated: it presents at from 850 to 8000 feet distance from the shore, a progressive running from 17 to 58 feet, and averaging, for the first 1000 feet, 2 feet increase per 100 feet, and about 6 inches per 100 feet for the following 1000 feet.

The greatest difference that has been observed in the level of the water was 6½ feet.

Winds.—Besides the variable winds, which are rather light, and the land and sea breezes of the morning and evening, two prevalent winds, the N.N.E. and S.S.W. winds, reign during a great portion of the year on the southern coast of the isthmus. The first of these two atmospheric currents is not felt at 60 miles east of Ventosa, beyond the Barra de Tonala; nor at 62 miles west, beyond the mountain of Chahuhé, which bounds on the west the lagoon of Tenglunda.

The N.N.E. wind usually begins to blow about the 15th of October and ceases in the fore part of April. In the month of November it blows without interruption, and at that time it reaches its maximum. Towards the middle of December it ceases during intervals of from 10 to 12 days, and then begins anew to blow one or two weeks. These alterations or interruptions and renewals are reproduced at short and unequal periods. But the length of the period of discontinuance goes on gradually increasing till the wind only blows one day, and finally ceases completely.

The Indians of Santa Maria del Mar are familiar with the indications announcing the coming of the N.N.E. winds. In the evening at about

sun-down, if the summits of the mountains of Guichicovi and San Miguel Chimalapa (seen from the coast) are concealed from the view by quantities of slate-coloured vapour, it is indicative that the "northers" will blow the day following, and will last as many days as the summits of those cordilleras continue to be covered with similar clouds. Vapour of a corresponding hue, seen at the same hour, at the horizon of the Pacific ocean, announces that the S.S.W. wind will blow on the day following.

The S.S.W. wind, which in winter succeeds the North wind, during one or two days at most, is the only general wind prevailing during the months of June, July, and August. After some gales of more or less intensity, which may be compared to the violence of the North wind, and not exceeding $1\frac{1}{2}$ to 2 hours' duration, the southerly wind is definitely fixed. Towards evening its intensity decreases till the next morning, when the same phenomenon is renewed. Still, this wind is subject to more interruption than the North wind, and the intervals of repose last longer. The S.S.W. wind, passing over the ocean, reaches the coast of the isthmus laden with vapours, which at certain hours of the day resolve themselves into abundant showers.

In winter and in summer, during the prevalence of the southerly and northerly winds, the current of the sea is from east to west; its greatest velocity is about $1\frac{1}{2}$ miles per hour. This continual movement in the waters of the Pacific is only discernible at a distance of about 6000 feet from the shores of Ventosa.

The bay of Ventosa is much safer than the harbour of Vera Cruz. Violent tempests frequently render the latter inaccessible during several days, and even when the North wind blows, the communication between the town and the vessels in the harbour is interrupted. During our sojourn at the isthmus of Tehuantepec, we never had to record one tempest or hurricane on the Pacific ocean.

In December 1850, while we were at Ventosa, the N.N.E. wind blew (off shore) with extreme violence from the 7th to the 17th of that month, and we remarked, with surprise, that the sea was not agitated.

To enable one to appreciate the condition of the sea at Ventosa, such as it actually is, it would perhaps be well here to mention that our soundings were effected by means of an open boat, 5 feet beam by 18 feet long, which we had brought from New Orleans, and which was conveyed across the cordillera; with this boat we were able to sail out 8 miles into the open sea."

Morro Ayuca.—From Ventosa bay the coast trends in a W.S.W.-ly direction, about 40 miles to the Morro Ayuca, and is but little known. This is the southern point of an open bay, the extent of which is about $1\frac{1}{2}$ miles, and whose shore is low and sandy. Here vessels may anchor in 6 or 7 fathoms, fine sand, at $\frac{3}{4}$ of a mile from the land, but only when the wind is from northward, for a strong wind from southward or south-eastward sends in so heavy a sea as greatly to endanger the vessel being driven on shore. A reef, with a depth of 8 and 4 fathoms almost close to it, surrounds the Morro for a short distance, and extends from its northern side about $1\frac{1}{2}$ cables' length; some of the rocks are, we believe, always visible. The Morro is a bold cliffy point, and its position, according to Sir E. Belcher, R.N., is lat. $15^{\circ} 51' 56''$, long. $95^{\circ} 48' 56''$.

Guatulco.—From the Morro Ayuca the coast continues to trend in a similar direction as that just mentioned, about 25 miles to the little harbour of Guatulco, which according to Sir E. Belcher, R.N., is in lat. $15^{\circ} 44' 24''$,

long. $96^{\circ} 8'$. It is formed by a rocky point which encloses on its west side a bay having a width not exceeding $\frac{1}{2}$ of a mile, and which extends nearly $\frac{1}{2}$ a mile to the north-westward. The soundings are 9 to 4 fathoms, gradually decreasing to the beach at its head; a flat of $1\frac{1}{2}$ to 2 fathoms extends from its north-eastern side nearly a cable's length, so that the deepest water is in the middle or over to the south side of the bay. A reef, having some rocks upon it above water, extends out in an easterly direction from the rocky point about $1\frac{1}{2}$ cables length; and, outside this a short distance, but separated from it by a narrow channel of 10 fathoms, are some rocky islets, having sunken rocks about them.

Port Guatulco affords shelter from all winds except those from south-eastward, which blow directly in; hence it is a convenient anchorage in the summer months.

Mr. Masters says of Guatulco and the coast eastward of it* "On entering the gulf of Tehuantepec, near the shore, we found the current setting to the W.S.W. $1\frac{1}{2}$ miles per hour. As the wind was easterly and light, we made a stretch to the southward, and in lat. 15° , long. $95^{\circ} 30'$, I had a boat lowered and tried the current, and found it setting S.S.E., 1 mile per hour; there had been a fresh breeze from the eastward the day previously. The following afternoon we were close in-shore, and found, as we approached the land, that the current had gradually altered, and was setting to the W.S.W. We came to an anchor the same evening in the bay of Bamba, which is to the south-west of Morro de Zipegua, the current setting to the W.S.W. nearly 2 miles per hour. After a fresh S.W. or southerly sea breeze, the current close in-shore has run to the S.E., but this is not general, and does not last a long time.

Whilst we were getting to the eastward in the gulf of Tehuantepec, we experienced a slight "norther"; as we stretched off-shore it hauled into the N.E.; a disagreeable short sea arose, the wind blowing in gusts, and the weather hazy.

Santa Cruz, port of Guatulco, in lat. $15^{\circ} 51'$, long. $96^{\circ} 17'$, is very difficult to make. It is situated in a small bay, about $\frac{1}{2}$ a mile wide at its entrance, and runs in northward upwards of $1\frac{1}{2}$ miles. At the bottom of the bay is a sandy beach, and on its eastern side are two huts which cannot be seen unless close in-shore. About $\frac{3}{4}$ of a mile E.S.E. from the eastern point of the bay is the Piedra Blanca, a reef of rocks extending east and west about a $\frac{1}{2}$ of a mile. The western part of the reef is about 40 feet high, and for about one-third of its length it is of the same elevation, but the remaining two-thirds to the eastward is low, and in places level with the water. When abreast of it, and off shore a few miles, it appears to be a part of the coast. Although it is called Piedra Blanca, it is a dark irregularly-shaped reef of rocks.

The anchorage in Santa Cruz is said to be good. It is well sheltered from all winds except between East and S.E. by S.; but, as the strongest winds blow from northward, except in the rainy season, it may be considered a very safe port. It is the only place that can be considered a harbour, eastward of Acapulco; and even in the rainy season, I was informed, a vessel might lie

* *Nautical Magazine* 1839.—The positions of Mr. Masters are about 7 miles northward and 9 miles westward of those by Sir E. Belcher. The whole of this coast is very imperfectly known, and many of the places mentioned by Mr. Masters cannot be recognised on existing charts.

there in perfect security. The depth of water in the bay is from 7 to 9 fathoms, with a clear bottom.

About 8 miles E.N.E. from Santa Cruz, is the island Tangelatangola, which is separated from the main by a channel a $\frac{1}{2}$ of a mile wide. This makes from the westward as a part of the main land; the outer part of it is quite bluff, or rather a cliff of a brownish stone, the strata of which are horizontal, and have the same geological appearance as the land on the main nearest it towards the N.E., and of the same height, namely, about 150 feet. Within the island and round the western side, is the entrance of the bay of Tangelatangola; it runs in about N.E., 2 miles. At the bottom of the bay is a fine sandy beach. The anchorage is said to be very good in it, but not equal to Santa Cruz. Its entrance is nearly a mile across, and continues nearly the same to the bottom.

Westward, $\frac{1}{2}$ a mile from the head which forms the western part of the bay or harbour of Santa Cruz, is a bluff point or head, under which is a good leading-mark for knowing the harbour. There is a cave in one of the rocks, level with the water, and close in-shore, and every swell that heaves in throws a quantity of water into it, and as the cave has a small aperture in the upper part of it, the water flies up resembling the spout of a large whale. It has often been taken for one by strangers, and deceived us by its appearance. In the night time, or foggy weather, when it is calm, or blowing a light breeze, the sound can be heard at some distance, like a whale blowing. This place is called the Bufadero.

When about 5 miles off the shore from the Bufadero, the western extreme point of land has a broken rocky appearance, and is not so high as the land adjoining. When about 2 leagues off-shore from the Bufadero, another cape, farther westward, can be seen. Its extreme point is rather low, but rises gradually inland to a moderate elevation.

Westward of Santa Cruz are two bluff heads, which, when abreast of, might be taken for islands. The first is about 3 miles from the port; the other is 2 miles further westward, and has a white sandy beach on its western side. On the eastern side of the eastern head there is also a small sandy beach, from which to the Bufadero the coast is rocky. The land which crowns this part of the coast is covered with stunted trees and brushwood. About 4 or 5 leagues N. 8° 30' W. is the Cerro Zadan, having a bell-shaped top, and a ridge on the north-east side connecting it with the higher range of the cordilleras. The Cerro Zadan is elevated above the sea rather more than 6000 feet. The mountains further inland, a few leagues, cannot be much short of 10,000 feet high, as they can be seen over the Cerro Zadan.

The port of Guatulco is so bad to make, that vessels have been upwards of a fortnight in searching for it; and it was by the greatest chance possible that we had not passed it, although we were not $1\frac{1}{2}$ miles from the shore. The two huts, which were on the beach, can scarcely be distinguished from the trees near which they are built.

From Morro de Ystapa the coast runs about E.N.E. to Punta de Zipegua, in lat. 16° 1', long. 95° 28' 30'. Between these points are several bluff headlands, which do not project far out from the general line of the coast, and afford no shelter. Punta de Zipegua forms the eastern part of what is called the bay of Bamba, and is a very remarkable headland. From the westward it shows itself with a bold dark cliff to the sea, about 400 feet high. It projects out from the western line of coast nearly a

mile, making like a double head. A short distance within the outer bluff is a peaked hill, with the appearance of a high-coloured sandstone, and quite bare of vegetation. Further inland, between 1 and 2 miles, the ground rises higher, in small hummocks, a few of which are quite bare, and others have a small quantity of stunted trees and bushes scattered over them.

The head, forming the western side of the bay of Bamba, is not so high, nor does it rise so suddenly from the sea as Punta de Zipegua. It is also covered with bushes. The eastern side of Punta de Zipegua is covered with bushes and trees, the sand only showing through the soil in a very few places. When abreast of it, and off the shore from 2 to 8 miles, the current was running to windward W.S.W., from $2\frac{1}{2}$ to 3 miles an hour. About N.E. from Punta de Zipegua, 4 or 5 miles, is a high reef of rocks called Piedra de Zipegua, or Machaguista, in the chart island of Eschivan. Its greatest elevation is from 60 to 70 feet; and its length is about $\frac{1}{2}$ of a mile in an E.S.E. and W.N.W. direction. It is said that there are no dangers near it but what can be seen. Between it and the main, from which it is about 4 miles distant, in a N.W. direction, is good anchorage; the best anchorage is close to the reef. The pearl oysters are plentiful near this reef; they are caught by the divers in the rainy season. The general line of coast, from Punta de Zipegua towards Tehuantepec, runs about N.E. by N. easterly.

As I had now passed northward and eastward of the position where, by my instructions, I was led to believe our cargo was, we hauled to the wind, with a fresh breeze from the southward, and made a tack or two to fetch the bay of Bamba. At 4h. p.m. we came to anchor abreast the western part of the beach, in 9 fathoms, sandy bottom, off-shore $1\frac{1}{2}$ miles. As soon as we anchored, I went on shore to ascertain where the wood was cut for our cargo, and, with difficulty, got to speak with an Indian, who was greatly alarmed at seeing such a large canoe (as he called the brig), and thought we were come to plunder the coast. His companion ran off to the woods, and he appeared likely to follow; but, when I got within speaking distance, regained his confidence, and replied in answer to my enquiry—'What made them afraid?' 'My companion, who is gone, is afraid; I am a valient fellow!' He certainly appeared to have the valour of a goose; his heart was beating against his sides, as if they would burst. We had not been many minutes together when he wanted to go aboard, and engage himself as my servant, that he might see the world; but then, said he, 'I am in debt to my master, so I can't go.' It is a common practice with the landholders of Mexico to get their workmen in debt, particularly if he is a good man; which secures their services equally, or probably more than if they were slaves, as they are compelled, if they have no cash to work it out.'

Shortly after I landed, the proprietor came down on horseback, and stated that he believed there was some Brazil wood at a place called Rosario, (in my instructions it was called St. Francis de Guatulco), and that Rosario was several leagues nearer Guatulco. He said that ours was the only vessel larger than a canoe, that had been on this part of the coast for a great number of years. No vessel had ever loaded hereabouts. The beach, or Playa de Bamba, is about 5 miles long, and must be very bad to land on, with a fresh sea breeze. There was more surf on it when we landed than was quite agreeable; and the boat was half-filled, although the wind was blowing along the coast. We remained at anchor until the morning, and got under way with the land breeze, keeping at about $\frac{1}{2}$ a mile from the shore, excepting

when abreast of the headlands. In the evening we came again to an anchor, in 9 fathoms, sandy bottom, opposite a small sandy beach, $1\frac{1}{4}$ miles from the shore; having seen nothing during the day like wood piled up, or anything in the shape of a signal. In the morning we again got under way, and stood to the westward; and at 10h. A.M. were off the port of Guatulco. I sent the boat on shore to enquire for the place where our cargo was lying; an Indian got into the boat, as they were shoving off, with the intention of seeing the vessel; from him I learned that we had passed it, and, as he knew the place, I kept him on board, and made all sail, with the wind S.W., for the place, and at 6h. P.M. came to an anchor in the bay of Rosario. The consignees came on board before we were at anchor, and, by their talk, I expected to get loaded in a week; instead of which we lay there three weeks before the canoes arrived, or before they were prepared for shipping the wood off.

The town of Guatulco is 8 leagues from the port, and this is the only port in the state of Oajaca, where goods can be imported. Its commerce can be easily imagined, when the person who is *administrator* of the customs, is also captain of the port, &c.; indeed he is the only individual, both in the marine and custom-house departments, with the exception of an old man, who lives at the port, and sends him information when there is any arrival. Mexican vessels can load on the coast by having an order from any custom-house in the Republic where they may have touched at; but foreign vessels are compelled to touch at Santa Cruz to pass the custom-house visit.

From the island Tangolatangola to the bay of Rosario there are several small headlands, which do not project much beyond the general line of coast, with the exception of Morro de las Salinas de Rosario. Most of them have a steep cliff facing the sea, with fine sandy beaches between them, at the back of which are scattered a few small trees and bushes; the land rising in very irregular-shaped hills towards the cordilleras. Abreast of the beaches, between the heads, I found the anchorage quite clear; and when in 9 to 12 fathoms water, the distance off-shore is about a mile, with sandy bottom.

The west side of the bay of Rosario is formed by the Morro de las Salinas de Rosario, and is in lat. $15^{\circ} 50' 25''$, long. $96^{\circ} 2'$. It projects about a mile beyond the line of coast. On its western side is a beach 4 or 5 miles in length to the next head. When abreast of Morro de las Salinas, it appears like an island with two large rocks abreast of its eastern and western part, but the whole is connected with the main. What appears to be the eastern rock, is a broken rocky head, about 160 feet high. The western is about half that elevation. Both these heads terminate with a broken cliff; the tops of them are bare and of a greyish colour, but the lower part is quite black, caused by the sea breaking against them. Between these heads is a small sandy bay, at the foot of the Morro, which rises gradually from the beach to the top of the hill; this is about 180 to 200 feet high, and presents a very barren appearance, having but a few straggling bushes on it. The beach of Rosario is 10 miles long, from Morro de las Salinas to Morro de la Laguna Grande, which is its eastern extremity. At about half the distance between the Morros, is a rock on the beach, about 40 feet high, and nearly the same diameter at spring tides. The water flows round it.

During the time of our lying in the bay of Rosario, which was from the 12th of February to the 1st of April, we had three smart "northers," which came on at the full and change of the moon. At this time the surf runs very heavy on the beach. Our boat was capsized several times while we lay here,

in landing and coming off. At times the sea broke very heavily in all parts of the bay, that is, on the beach. I was caught on shore, a few days after arriving here, during the first "norther", which came on suddenly, with a parching hot wind. A cross confused sea hove in from the south and north-east. The wind must have blown strongly out in the gulf, from the same direction; and, though it blew heavily for three days, with the wind at times to the westward of North, the sea kept up until some time after the "norther" had ceased blowing. This is not generally the case, for a strong "norther" (and particularly if it veers round to N.N.W.) beats the sea down; at which time the landing is attended with little or no risk, which was the case when we had the last two "northers". I was informed (and, judging from appearances, I think correctly,) that very often when the wind is in N. or N.N.W., close in-shore, it is N.E. in the offing, which makes it impossible to land on the coast. I remarked, whilst lying here, at the full and charge of the moon, and when no "norther" was blowing, that, although the surf ran so high that no boat could land, the vessel lay without any motion. We were moored at less than 800 fathoms from the shore. The surf appeared not to be caused by a swell rolling in and agitating the sea at the surface, but to rise from below, and without any apparent cause, as we had light winds and fine weather the most of the time we lay here. On another occasion, I was caught on shore with a boat's crew for three days. In attempting to get off to the ship, the boat was capsized and stove. It was then, and had been for a week previous, nearly a calm. The heavy ground-swell invariably hove in from the S.S.W. We fortunately escaped from this beach without losing any of our people, which was more than I expected, having had three laid up at different times, who were saved from being drowned by a mere chance.

In addition to what has been said about this part of the coast, it can be known by the low land at the back of the beach of Rosario, which runs in from 1 to $2\frac{1}{4}$ leagues before there is much rise in it, and is thickly covered with trees. From North to N.W. of Morro de las Salinas, nearly 2 leagues from shore, the rising ground is formed by a number of small barren hillocks. From our anchorage, at the place where we loaded, the following bearings were taken, lying in 9 $\frac{1}{2}$ fathoms, sandy bottom. There are two large patches of a whitish appearance, the farthest range of the cordilleras; the eastern is the lowest, and bore N. $59\frac{1}{2}^{\circ}$ W. The appearance cannot be seen, unless from a little to westward of Morro de las Salinas. This has every appearance of being a waterfall, and rises from the other patch in a N.W. direction, at about an angle of 45° . It issues from a small valley in the Cerro del Chonga. The highest point of this range has but a small elevation above it, and is covered with trees. The waterfall inclines towards the south, and can be seen for several hundred feet descending, before it is lost sight of amidst the forest below. Cerro de Zadan bore N. 89° W.; the extreme bluff of Morro de las Salinas, S. 86° W., $8\frac{1}{2}$ miles; the eastern point well within the bearings, and Punta de la Laguna Grande, N. 71° E., 6 to 7 miles; the rock on the beach, mentioned as being 40 feet high, N. 65° E.; and the galena or shed, under which the cargo was piled, N. 26° W., $\frac{1}{2}$ a mile.

At the western part of the bay are four palm-trees, close to the beach. The distance from the Morro de las Salinas is about $\frac{1}{4}$ a mile, and between these trees and the Morro is a larger cluster of palms. Between these two clusters is, at all times, the best place to land, as a boat can beach here with comparative safety, when, at every other part of the bay, the sea runs very

heavy. At the neaps we found the place quite smooth, with the exception of a sea heaving in about every 10 or 15 minutes; but it causes no risk to a boat, provided she is kept end on.

At the south-western part of the beach, and where a small pathway leads to cross the Morro de las Salinas, close to the sea side, in the cliff of a rock is a small spring of excellent water. We always found it clear and cool, even at noon; my consignee said we could fill the ship's stock of water from it with dispatch, but I soon found out that he knew nothing about it. The quantity that could be filled in a day did not exceed 80 gallons; and, after having landed all our water-casks, we had to re-ship them, through a great deal of surf, and land them at the galena, abreast of the ship. We filled our water at a well about a mile from the beach, but the supply was very limited, it being the only well that had water in it up to the day of our sailing. We did not complete our stock.

A captain of a ship should trust to no promises when he comes here, either with regard to supplies or anything else, no matter by whom made; and, as water and fuel are indispensable articles, the filling the one and cutting the other, should be commenced immediately on arrival, by some of the crew. It is useless to employ Indians to work for the ship (that is, on shore), as the greatest part of them will neither be led or driven. On board they answer better (that is, a few of them), to haul the wood about in the hold. I found the promises of Indians, and, as they call themselves, '*Gente decente y civilizado*,' on a par.

Near the Morro de la Laguna is a large lake, from which the headland takes its name. A few miles farther eastward is the Morro de Santiago de Ystapa (in the chart it is called Morro de Ayuta), near which is the entrance of the small river Ayuta, the stream that runs by Huamilulu and Ystapa. There is a bar across the entrance. The canoes land on the beach in preference to going over it, as it is attended with danger."

Sacrificios is a little port situated about 10 miles south-westward from Guatulco. In front of it is a small islet, about $\frac{1}{2}$ of a mile across, which shelters the bay from easterly winds. The depth is about 4 fathoms on sand. The position assigned to the bay is lat. $15^{\circ} 44'$, long. $96^{\circ} 19' 7''$. It is high water on the days of full and change of the moon at 8h. 15m. P.M.; the rise of tide is about 6 feet.

The Coast.—Acapulco is distant about 210 miles westward from port Sacrificios; the coast between has not been surveyed; it is consequently but little known, and should have a wide berth given to it. A sunken rock is inserted in some charts opposite the river Dulce, on the authority of the ship *Clío*, at about 8 miles from the shore, in lat. $16^{\circ} 28'$, long. $98^{\circ} 44'$; the depth around it is stated to be 6 fathoms.

Captain Miguel Garcier, coast pilot at Acapulco, states, that from 2 to 8 miles off Cuacaual point (which is about 12 miles S.E. of the river Dulce and the first break in the sandy head to the eastward) there is deep water and anchorage in 8 to 10 fathoms; thence a shoal extends upwards of 4 miles seaward, breaking in the rainy season with S.W. gales, and having as little as 10 feet water on it,—and this information has been corroborated by the evidence of the captains of several coasting schooners. H.M.S. *Tartar*, when standing along this part of the coast on the 4th of March 1863, grounded on a shoal south-east of the river Dulce, in lat. $16^{\circ} 11'$, long. $98^{\circ} 32'$; the vessel's draught was 18 feet, but the least water obtained was $8\frac{1}{2}$ fathoms.

ACAPULCO.—The port of Acapulco consists of a bay about $1\frac{1}{2}$ miles deep and having an extent from East to West of about 8 miles, in which are soundings of 20 to 10 and 7 fathoms. It is considered to be the finest harbour in Central America; and, for its size, one of the most complete in the world. It affords sheltered and land-locked anchorage in 16 fathoms and under in an extent of about 1 mile square; which, allowing for moorings, would, at half-a-cable range, or one cable asunder, accommodate 100 sail of vessels, even of the line. The bottom is sandy at its surface, but clayey beneath, and holds well.

All round the harbour, on every side, are high mountains, which, on the north and east sides, range from 2000 to 2700 feet in height, and on the west side from 800 to 500 feet. They afford considerable shelter to the harbour, and may be seen at a great distance at sea.

Eastward of the port, and just outside the entrance, is a little bay named port Marques, having an extent of about $1\frac{1}{2}$ miles in an easterly direction. The soundings in it are 20 to 5 fathoms, mud, sand and rock, and there is good shelter from all but westerly winds, which blow directly in. Its southern point, named Diamante, has a reef extending from it a short distance; there is also a small islet or rock on the north side of the bay at about a cable's length from the shore, and at nearly the head of the bay is a sunken rock;—these can be easily avoided. Vessels seldom enter port Marques, the bay of Acapulco possessing superior advantages.

Westward of the port and also immediately outside the entrance, is an island named Roqueta or Grifo, which extends nearly East and West 1 mile and is of very irregular shape, but is about $\frac{1}{2}$ of a mile across in its broadest part, the middle. Its eastern and western extremities have each a reef extending seaward nearly $1\frac{1}{2}$ cables' length, parts of which are above water; in other respects the island is clear of any known sunken danger beyond a moderate offing. At a $\frac{1}{2}$ of a mile from the island, there is a small islet or rock, 50 feet high, named Morro, outside of which is a depth of 20 fathoms. The passage between Roqueta island and the shore is about two cables' length wide, in its narrowest part, and has a depth of 16 to 20 fathoms; it is known as the Boca Chica, while the channel between the east and west points of the harbour is termed the Boca Grande.

At $\frac{1}{2}$ of a mile almost due East from the Morro islet, is a rock only 4 feet above the water, and having a depth close to it of 10 and 12 fathoms. Its position is a dangerous one to vessels making Acapulco from westward, and rounding Grifo island rather closely.

The town of Acapulco is on the west side of the port, and has long been in a state of decline, owing to the bad custom-house regulations, which cripple the energies of its merchants. Its market is but indifferently supplied; but fowls, and excellent fruit and vegetables, are readily obtained. Its position, from observations taken at the fort by Captain Beechey, R.N., is lat. $16^{\circ} 50' 32''$, long. $99^{\circ} 50' 44''$.

In the north part of the bay are some rocks, named San Lorenzo, situated at a short distance from the shore, between which is no safe passage. About $\frac{1}{2}$ a mile eastward of these is another rocky islet, called Obispo, of a white colour, and about 148 feet high. The depth on the seaward side of these rocks is 7 to 10 fathoms.*

* A rock, nearly awash at low tide, was discovered some years ago in the northern part of Acapulco bay by the French ship *Serieuse* striking upon it. The depth over it was

Some mountains north-westward of Acapulco bay, named the Paps of Coyuca, are considered to be a good mark by which the situation of the bay may be known. The following remarks are by Captain G. H. Richards, R.N., of H.M.S. *Hecate* 1863 :—

"The port of Acapulco is 90 miles in an E. by S. $\frac{1}{4}$ S. direction from Mangrove bluff, subsequently mentioned. In approaching it from westward the Paps of Coyuca are a good guide; they are two distinct conical summits, and the mountain is about 4000 feet high; it lies N.W. by N. nearly 80 miles from Acapulco, and 20 from the coast. The land westward of Acapulco is high. At the distance of 10 or 12 miles from the coast two distinct ranges are seen; the nearer one about 2500 feet high; and the more distant one, of which the Paps form a portion, over 4000 feet. When the Paps of Coyuca bear N. by E. $\frac{1}{4}$ E., a red stripe, or land-slip will be seen on the coast right under them. A square table-topped mountain rises just westward of Acapulco, to between 2000 and 3000 feet. When within 8 or 10 miles of the port, Roqueta island is seen, which has a high, yellow, cliffy coast; as also the point of the main land northward, forming the entrance of the Boca Chica.

Diamante point, which appears as the eastern extreme of the land, shows as an island at the distance of 7 or 8 miles; the head of port Marques, of which it forms the south point of entrance, being low. Making Acapulco, from the south-west or southward, the entrance is remarkable, from the yellowish cliffs of Diamante point, and Roqueta island which may be seen at a considerable distance. The Paps of Coyuca are also seen, but the eastern peak appears cut off. There is also a white wooden tower on the summit of Roqueta island, which is used for a lighthouse and seen 6 or 7 miles off. The light is only exhibited when the Pacific mail steam company's vessels are expected."

Sir Edward Belcher, R.N., says "I cannot persuade myself that the Paps of Coyuca are useful for making the harbour, although in the offing they may be if not obscured. Acapulco may be approached from southward or westward, by keeping the western cone open of the land, which will lead up to the Boca Chica entrance, or until Acapulco port is so close under the lee, that no further marks are necessary. There is not any hidden danger in the entrance to Acapulco. Keep a moderate distance from either shore; 5 fathoms will be found alongside all the rocks, and 25 to 30 in mid-channel. Round point Grifo (the western point of the harbour) sharply, rather than stand over to San Lorenzo, as the wind, generally westerly, heads on that shore. If working, tack when the rocks on the south point of Town bay show in the gap.

The two best berths are off the rocks alluded to; that outside is preferable, but in either case let the outer rock bear W.S.W. or W.N.W., so that a hawser fast to the rock may keep your broadside to land or sea breezes, and prevent a foul anchor.

It would naturally be inferred that, as the harbour is surrounded on every side by high mountains, the breeze would scarcely be felt and the heat be intolerable. This is confined to the town limits; at our observatory, and at the port, San Carlos, we enjoyed a constant breeze.

In all harbours there may be objectionable berths, but in that of Acapulco, if care be taken to keep in the line of what I have designated the 'West Gap,'

15 feet (?) and the position assigned to it was, 1000 metres or 1098 yards N. 76° E., true from fort San Diego, which places it nearly on a supposed line from the fort to Obispo Islet.

or neck of the peninsula, open of the south point of the town bay, both land and sea breezes will be felt in their full strength, and free from causes which would heat them before entering the port, the neck being but a few feet above the sea-level.

Water of good quality was found at several points between the fort and Obispo rock; but the two best streams are between the fort and San Lorenzo."

M. de Petit-Thouars of the French surveying vessel *Venus*, 1888, says "The currents are not felt in the road, but, outside it they run to the S.E. with a strength varying from a $\frac{1}{2}$ to 2 miles. This current is more rapid during the ebb.

In the fine season, that is to say, from December to May, the land and sea breezes are regular enough. They are feeble during the night, coming from N. to N.E. and E.; and from S.W. to W.S.W. and to N.W. in the day. In the other months of the year this coast is dangerous, and but little frequented.

The usual anchorage is to the south of the fort, and before the town, in 11 to 13 fathoms, muddy bottom; it is perfectly safe. In case of necessity, anchorage can also be obtained in the Boca Grande."

It is high water at Acapulco on the days of full and change of the moon at 8h. 6m.; the rise of tide is about $1\frac{1}{2}$ feet. We believe that a small light is shown on point Grifo, and another on the south-east end of Roqueta island, when the steamers of the Pacific Mail Company are expected.

The Coast.—From Acapulco bay the coast trends about 80 miles in a W. by N. $\frac{1}{2}$ N. direction to point Tequepa, on the eastern side of which is the river Coyquilla. We have no information of this part of the coast until we get to Morro Petatlan, 20 miles further to the north-westward, off which are some rocks named the White Friars, from their supposed resemblance to a cross. They have been described by Lord Anson, in the following manner:—

"The hill of Petatlan may be at first mistaken for an island, although it is in reality a peninsula, joined to the continent by a low and narrow isthmus, covered with shrubs and small trees. The bay of Sihuatanajo extends from this hill a great distance to the westward, and has, at its entrance, just off the hill of Petatlan, an assemblage of rocks, white with the dung of boobies and other tropical birds. Four of these rocks are high and large, and, together with several smaller ones, are, by the aid of a little imagination, made to resemble the form of a cross, and hence are called the White Friars."

SIHUATANEJO, is about 7 miles westward of Petatlan. It is a small but excellent harbour, of about a mile in extent, and open to all winds from south-westward. At its entrance are soundings of 10 fathoms, decreasing gradually towards the head of the bay, where there are $2\frac{1}{2}$ to $1\frac{1}{2}$ fathoms. It has been surveyed by Captain Kellett, R.N., who places it in lat. $17^{\circ} 88' 8''$, long. $101^{\circ} 30' 52''$. Lord Anson has described it in the following terms:—

"It is about 80 leagues westward of Acapulco, and may easily be found by keeping well in with the land, especially if sailing down the coast from Acapulco. There is a beach of sand extending 18 leagues from Acapulco to the westward, against which the sea breaks so violently that we found it impossible to land with our boats; but yet the ground is so clean, that, during the fair season, ships may anchor in great safety, at the distance of 1 or 2 miles from the shore. The land adjacent to this beach is generally low, full of villages, and planted with a great number of trees. On the tops of some small eminences there are several look-out towers, so that, altogether, the face of the country presents a very agreeable aspect; for the cultivated

part, which is the part here described, extends some leagues back from the shore, where it seems to be bounded by a chain of mountains, which extends a considerable distance on either side of Acapulco.

The beach described above is the surest guide to those seeking Sihuatanejo; for 5 miles westward of the extremity of the beach there is a hummock, which at first makes like an island, and is in shape not much unlike the hill of Petatlan, though much smaller. Three miles westward of this hummock, is a white rock near the shore, which cannot easily be passed by unobserved. It is about 2 cables' length from the shore, and lies in a large bay about 9 leagues over, the west point of which is the hill of Petatlan.

The harbour of Sihuatanejo is easily distinguished by a large rock, $1\frac{1}{2}$ miles S. $\frac{1}{4}$ W., from the middle of the entrance. I may add that this coast is no ways to be dreaded between the middle of October and the beginning of May, nor is there any danger from the winds. In the remaining part of the year, there are frequent and violent tornadoes, heavy rains, and severe gales, in all directions of the compass.

These are the marks by which the harbour may be known by those who keep well in with the land; but there is no mark for those who keep at a considerable distance at sea, who must, consequently, make it by the latitude; for there are so many ranges of mountains rising one upon another inland, that no drawings of the appearance of the coast can be at all depended on, every little change of distance or position bringing new mountains into view, and producing an infinity of different prospects, which render all attempts at delineating the appearance of the land impossible.

The entrance of the harbour is but $\frac{1}{4}$ a mile broad; the points which form it, and which are faced with rocks almost perpendicular, bearing from each other S.E. and N.W. The harbour is surrounded on every side, excepting the western, with high mountains covered with trees. The passage in is very safe, on either side of the rock that lies off the entrance, though we, both in going in and out, left it to the eastward. The ground without the harbour is gravel mixed with stones, but within is soft mud. It is necessary, when coming to an anchor, to make a good allowance for a great swell, which frequently causes a great send of the sea; as, likewise, for the ebbing and flowing of the tide, which we observed to be about 5 feet, and to set nearly East and West.

The watering-place is at the head of the bay. During our stay it had the appearance of a large standing lake, without any visible outlet into the sea, from which it is separated by the strand. The origin of this lake is a spring, which bubbles out of the ground nearly $\frac{1}{4}$ a mile inland. We found the water a little brackish, but more considerably so towards the sea-side; for the nearer we advanced towards the spring-head, the softer and fresher it proved. This laid us under the necessity of filling our casks from the farthest part of the lake, and occasioned us some trouble; and would have proved still more difficult, had it not been for our particular management, which, on account of its convenience, deserves to be recommended to all watering at this place. Our method consisted in making use of canoes drawing but little water; for, on loading them with a number of small casks, they easily got up the lake to the spring-head, and the small casks being there filled, were in the same manner transported back to the beach, where were some of the hands to put them into casks of a larger size.

Though this lake, during our visit, appeared to have no outlet to the sea, yet there is reason to suppose that in the rainy season it overflows the strand and communicates with the sea, for Dampier speaks of it as a large river. Indeed it is necessary that a vast body of water should be amassed before it can rise high enough to overflow the strand, since the neighbouring lands are so low that a great part of them must be covered with water before it can run out over the beach.*

The Coast.—From Sihuatanejo harbour the coast trends north-westward and westward about 56 miles to a low, well-defined point of land, named Mangrove bluff, situated in lat. $17^{\circ} 54' 5''$, long. $102^{\circ} 12' 41''$, and forms thereby a large open bay, at the head of which are what are termed in the charts, the Canuta or Salt-pits. Over the east side of Salt-pit bay is a high and very remarkable mountain.*

At a short distance from the north-west side of Sihuatanejo harbour, are three white islets or rocks, known as the Blancos islets, of which the easternmost, is the largest; they are square in form and not unlike a haystack in shape; and are very conspicuous from the offing.

The depth at nearly 2 miles immediately south of Mangrove bluff, is only 14 fathoms, on a shingle bottom, and this depth continues eastward of the bluff at the same distance from the shore, for about 8 or 4 miles, when it suddenly deepens. At 8 miles westward of the bluff, singularly enough there is a depth of 182 fathoms, on mud, at scarcely 2 miles from the beach.

From Mangrove bluff the coast trends W. by N. $\frac{1}{2}$ N., nearly 50 miles to a low cliffy headland, named Lizard point, situated in lat. $18^{\circ} 11'$, long. $108^{\circ} 5'$, and is throughout nearly straight and without any remarkable feature. Some of the mountains close to the sea are 1100 feet high, and at 6 miles eastward from the point is one which rises to the height of 1500 to 2000 feet. The soundings at 6 miles westward from the bluff, and 8 miles off shore, are 60 to 70 fathoms, mud, which soon decreases to 40 and 35 fathoms, and this latter depth is maintained for about 8 miles eastward from the point at a corresponding distance from the land,—namely 8 miles.

From Lizard point, the coast (which is generally steep and rises abruptly to the height of 2000 feet) continues to trend W. by N. $\frac{1}{2}$ N., a distance of 26 miles to Tejupan bluff, a bold cliffy point, having two small rocky islets off it. At 10 miles before reaching the bluff there is a bold projecting point of land, known as White Rock point, from the circumstance that three white rocks lie off it in an E.S.E. direction; inside of these rocks is a fertile looking spot with a village, and probably landing and shelter for boats.

At about 11 miles from the sea, and nearly midway between Lizard point and Tejupan bluff, is the mountain named the Paps of Tejupan. It is 5800 feet high, has a double nipple summit, and appears conspicuously to a vessel passing up or down the coast, but not so distinctly when viewed directly from seaward, as it is then overshadowed by the ranges of more lofty mountains behind it.

From Tejupan bluff, the coast, composed alternately of sandy beach and high cliff, trends about N.N.W. to Black head, a distance of 18 miles. The

* A little river, the Sacatula, is represented in an old chart as falling into the sea on the east side of Mangrove bluff, but Captain Richards, R.N., says that if there is a stream it must be a very small one, for nothing of the kind could be distinguished from the mast-head at the distance of $1\frac{1}{2}$ miles.

hills rise in successive ranges parallel with the coast-line; those near the sea have an estimated height of 1500 to 2000 feet, while those further in land are much higher. Black head, in lat. $18^{\circ} 36' 18''$, long. $108^{\circ} 41' 51''$, is a cliffy peninsula, connected to the shore by a sandy neck. A small white rock, 47 feet high, lies $\frac{1}{2}$ a mile N.W. of the northern extreme of the peninsula, and a bay (where there is anchorage in fine weather in 14 fathoms at $1\frac{1}{2}$ miles from the shore) lies northward of the rock. There is also anchorage in 16 fathoms at about 7 miles south-eastward from the head, at 1 mile from the shore.

The depth at 8 miles off Tejupan bluff is very great, as the bottom was not reached by the surveyors with a line of 172 fathoms, and this deep water was found to exist, at a similar distance from shore, for 26 miles eastward of the bluff or as far as Lizard point. Northward of the bluff, this deep water is succeeded by soundings of 55 to 40 fathoms, decreasing as Black head is approached, off which, at 2 miles due West, is a depth of 33 fathoms, sand.

The mountains in the interior of this part of Central America are very lofty. That named Colima, 12,008 feet high, the summit of which is estimated to be in lat. $19^{\circ} 24' 42''$, long. $108^{\circ} 38' 1''$, is very remarkable when seen distinctly; but the haze, which generally hangs over the distant land, renders this seldom the case, and it therefore cannot be counted upon as a land-mark. It is a saddle-shaped mountain, having two sharp conical summits, of apparently nearly the same height; the horizontal measurement between them from off Tejupan bluff is 45 miles.

From Black head to the Sail rock, off point San Francisco, the eastern point of Manzanilla bay, the distance is about 40 miles in a W.N.W. direction. The coast between is low, being not more than 15 to 20 feet high, and is fronted by a sandy beach.

MANZANILLA BAY.—Manzanilla and Browning bays (the latter a small bay immediately north-westward of Manzanilla bay, from which it is separated only by a little narrow projection of coast, named Pelican point) have an extent together of about 5 miles in a north-westerly direction; from a supposed line connecting the outer points of these bays the coast recedes $8\frac{1}{2}$ miles. The soundings at the entrance are about 40 fathoms, and these decrease gradually to the beach, off which at a moderate distance is a depth of 5 to 8 fathoms. The village of Manzanilla is in the south-east part of the bay, and consists of only a few huts. Behind it is a large lake which, with the marshy land surrounding it, makes the port very unhealthy, especially in the fine season.

In Manzanilla bay there is good shelter from southerly winds but not from those directly from westward. Browning bay is open to southward, and is consequently safe only with off-shore winds. The anchorage in Manzanilla bay is at about $\frac{1}{2}$ of a mile northward of the houses, in 9 to 10 fathoms, and it is said that the ground holds well. When approaching either of the bays from westward, a good look-out must be maintained for the Sisters, a cluster of rocks above and under water, situated rather more than $\frac{1}{2}$ a mile S.S.E. from Gowland point, the west extremity of Browning bay.

Manzanilla is the port of Colima, a large city about 90 miles in the interior, which is reported to have 80,000 inhabitants. It has been open to foreign vessels a great many years, but is still far from prosperous.

Manzanilla bay was surveyed by Captain G. H. Richards, R.N., in 1868, and the west end of the village ascertained to be in lat. $19^{\circ} 8' 18''$, long.

104° 17' 41". He observes "The bay may be known by the white islet 2½ miles westward of its west point of entrance.* A high rock lies close off this point; and another white rock (100 feet high) resembling a sail, at a ¼ of a mile off the eastern point. From the westward they are both remarkable. Approaching Manzanilla from westward, the Vigia Grande, a remarkable cone-shaped hill, will also be seen just inside the Sail rock; it is 740 feet high, and rises immediately over the anchorage. As neither the houses nor shipping can be seen from seaward, this is a good mark to steer for, passing from 1¼ to 2 miles outside the White islet, and the same distance from the west point of entrance, when the Vigia Grande will bear E. ¼ N., and may be steered for.

This course will lead more than a mile southward of or outside the Sisters, a group of five rocks, the largest of which is 10 feet high. They lie in a direct line between the west point of entrance and the Vigia Grande, distant from the former 2½ miles. A very remarkable table-topped mountain, 2600 feet high, rises over the western point of the bay, and is an excellent guide for the port. The anchorage is immediately under the Vigia Grande, about ½ of a mile from the village, in 9 or 10 fathoms water; over mud, and good holding ground.

The bay is safe with all winds except gales from West or S.W., which do not occur between the months of November and June,—the dry season, and singularly enough, the least healthy; fevers and ague prevail, more or less, at all times, but are more fatal during the dry season. It is not recommended to lie here more than four or five days at a time, and to take an off-shore berth, where the sea breeze will reach.

Fresh beef and vegetables, as well as other necessities, can be obtained here. Fresh water should on no account be received on board; it is desirable that the crews of vessels should land as seldom as possible, and not be exposed in boats when avoidable."

The following remarks are by Mr. G. H. E. Horn, of the Hamburg barque *Colima*, 1860. "When making the port of Manzanilla, the white rocky island of Piedra Blanca is an excellent mark, as it is seen from a considerable distance, standing out in contrast with the darker hue of the coast behind and of the rocks near it. Having sighted this islet, bring it to bear about N. by W., when a lofty peak in the interior will bear N. ¼ W., you then have Manzanilla, behind point San Francisco, about N. 80° E., on which course steer for the port. Approaching the coast you will observe the heads of several islets and rocks that lie about 1 or 2 cables' length off shore and around which is deep water. From off point San Francisco, the bay has a regular decreasing depth from 27 fathoms outside to 5 fathoms within a cable's length of the shore. Give this point a good berth, as off its extremity, at the distance of about 80 yards, there are several rocks, above and under water; it is also advisable not to carry more sail than necessary to keep steerage way on the vessel, for the harbour of Manzanilla being small you must anchor

* Known as Piedra Blanca, an islet 300 feet high, and in lat. 19° 6', long. 104° 27' 30", according to the chart of Captain G. H. Richards, R.N. It is 9 miles westward from the anchorage in the bay, and lies about 1 mile from the shore. It is a ¼ of a mile long, appearing wedge-shaped when seen from westward, and remarkably white, being the resort of numerous sea birds. This islet is the mark for Manzanilla bay, and may be seen from westward immediately on rounding Navidad head, a distance of nearly 20 miles; it then appears just inside the extreme of the land. It can be seen easily from a vessel's deck at a distance of 15 miles, when bearing from E. ¼ S., round by north to W.N.W.

almost immediately you have passed the point. When at the anchorage vessels can moor in perfect safety within $\frac{1}{2}$ a cable's length of the beach ;— it will be much in your favor to bring up as near the shore as possible, as you can then discharge and load with greater rapidity. Making the bay you must not expect to see an inhabited place of importance ; to the westward, in the small harbour of San Antonio,* there is a rancho of eight or nine huts, while to the eastward, in the harbour of Manzanilla, is the town of the same name, containing a few houses and about fifty huts, but these are not visible until you have rounded point San Francisco. The harbour is quite safe in both seasons.

The crews of vessels frequently suffer from sickness here, occasioned by exhalations from the great swamps near Manzanilla ; added to which there is no good water to be procured in the harbour. By taking a little trouble, however, as there is a small brook across the bay, about N.W. from the anchorage, this most necessary article may be procured of tolerable quality by pursuing the following directions :—

Every vessel bound to Manzanilla ought to be provided with several strong, heavily iron-bound hogsheds, fitted with staples for ropes to be made fast to ; hire in Manzanilla a canoe to land the crew as well as to carry the utensils to the brook, which is very shallow at the entrance, not allowing an ordinary ship's boat to enter. For the purpose of filling water you ought to choose, if possible, a very calm day, and stowing the casks to be filled into a long-boat or launch, moor near the brook, at the back of the surf, as near the shore as possible, land the men and utensils,—leaving a few hands in the launch to hoist in the casks ; then fill the hogsheds in the brook and roll them across the strand into the proximity of the launch ; with a running line to the boat haul the hogsheds alongside through the surf, and start them into the large casks. It would be advisable to fit the launch with sails, the distance across the bay being considerable. Good sport is to be found on the bank of the brook ; wild ducks, geese, snipes, &c., being very abundant. There are also many alligators about, but they are very shy, and easily frightened away ; with a little precaution there is nothing to fear from them."

The Coast.—From Manzanilla bay the coast trends W. by N. about 20 miles to cape Graham, the south point of Navidad bay, situated in lat. $19^{\circ} 10' 80''$, long. $104^{\circ} 40' 80''$. Throughout nearly the whole of this distance (for 18 miles eastward of the cape), it consists of a low shore, not more than 15 or 20 feet high fronted by a sandy beach, and having behind it a lagoon. In the interior the land rises in distinct ranges to between 3000 and 4000 feet. On this sandy beach boats may generally land during fine weather, and there is safe anchorage in 18 fathoms at $\frac{1}{2}$ a mile from the shore.

Cape Graham is about 700 feet high and has a high peaked rock close to it, as well as a smaller one, which, however, do not readily appear as detached from the land from any position that a vessel would be in. There is also a small rock, (12 feet above low water and always visible, being a few feet above the surface at high tide) at about $\frac{1}{2}$ a mile S.W. from the cape ; on account of this rock, some care is required when approaching Navidad bay from south-eastward.

NAVIDAD BAY is formed by cape Graham and a very white projecting point of land, named Harbour point, $2\frac{1}{2}$ miles N.N.W. from it. It has sound-

* We suppose that this is Browning bay of Captain Richards' chart.

ings shoaling from 25 fathoms at the entrance to 6 and 5 fathoms at a short distance from the beach, or sand. The anchorage is in the north part of the bay, in 6 to 7 fathoms, under Harbour point which protects it from south-west winds. At nearly 6 miles westward from the anchorage is a bold headland, named Navidad head, which is a conspicuous point of land especially when viewed from north-westward. Navidad head and bay are thus described by Captain G. H. Richards, R.N., "Navidad head is a wedged-shaped summit, about 400 feet high, falling in shore to a low neck, and is remarkable when seen from any direction. On approaching it, within 3 or 4 miles, it is seen to be an island, separated from the main by a low rocky ledge, which the water rises over. Off the head are three remarkable rocks, extending in a south-west direction; the centre one being white, with a smooth round top, covered with vegetation, and about 70 feet high. These rocks give the head some slight resemblance to Farralone point, with the Frailes rocks, (9 miles westward from it) when seen from the north-westward; but the peculiar shape of the wedge island would prevent the possibility of a mistake after the first glance.

The white rock of Navidad has been mistaken for the white islet of Manzanilla by strangers, and accidents have occurred in consequence, but this mistake could only have arisen in the absence of any chart. The Navidad rock is small, the centre of three, and stands off a prominent headland. The white islet of Manzanilla, 20 miles to the south-eastward, is very much larger, remarkably white, and stands alone, a mile from the shore, but, being rather in a bight, cannot be seen projecting from any position a vessel would be in. Besides the three high rocks off Navidad head, there is a sunken one, which occasionally breaks, and lies S.E. $\frac{1}{2}$ E. from the white rock, distant a short mile.

After rounding Navidad head from the northward, at the distance of 2 miles, the white sandy beach of Navidad bay will be seen, bearing E. by N., distant 7 miles. At 2 miles southward from the white rock of Navidad there are 60 fathoms water, and steering thence for the anchorage it gradually shoals to 40 and 30 fathoms. The north beach of Navidad bay is in lat. $19^{\circ} 18'$, long. $104^{\circ} 41' 25''$.

As the bay is approached, Harbour point, a very remarkable high white point, will be seen on the northern shore. Immediately round and inside this is the anchorage, a very fair stopping place during the fine season, but it is not recommended for a sailing vessel at other times, as there is a difficulty in getting out with a S.W. wind;—the best berth is in 7 fathoms water, sandy bottom, with Harbour point bearing S.S.W. a $\frac{1}{2}$ of a mile, and the same distance from the eastern shore of the bay,—sailing vessels may anchor farther out, with the point bearing West, in 10 or 11 fathoms, but there will be more swell.

A single house stands in the north hook of the bay, and a lagoon within a few yards of the beach, where the water is fresh, and the natives say good, but it is not recommended to use it unless a vessel is in distress. At the south-east end of the bay is the north-west end of a long lagoon which here opens into the sea; a strong stream runs out of it, and there is sufficient depth for boats at half tide. There is a small village here, and some supplies of fresh provisions may be obtained. The anchorage off this end of the bay is not recommended."

TENACATITA BAY.—From Navidad head the coast turns sharply northward for nearly 8 miles, and then trends north-westerly for about 5 miles to Brothers point, the coast between these headlands forming a large bay named Tenacatita. The direct bearing and distance of Brothers point from Navidad head are N.W. by W. $\frac{1}{2}$ W. 5 miles. Brothers point has a rather remarkable double hill immediately over it, which from northward appears like an island; off the point is a high, square, perpendicular rock, and there are also some smaller ones about it above water, and others further out which from their position are dangerous. The most dangerous of the known rocks are the Porpoise, 7 feet above water, lying $1\frac{1}{2}$ miles W. by S. from the point; and another, upon which the sea breaks, S.E. by S. $8\frac{1}{2}$ cables' length from the point. On account of these rocks, Brothers point should have a berth of 2 miles.

Tenacatita bay is about $2\frac{1}{2}$ miles deep, and is said to contain one or two rocks in its north-west part. It has not been examined, and should consequently be entered with caution. It is asserted that there is good anchorage in its north-west corner, where protection may be obtained from winds from north-westward.

PERULA BAY.—From Brothers point the coast trends about 18 miles in a north-westerly direction to Flat Top point, the south extremity of Perula bay, which may be easily recognised by the remarkable flat-topped mountain, 1100 feet high, which rises over it and is conspicuous from northward and westward. When running along this shore, the Frailes, situated about 5 miles from Brothers point, will present themselves to view as two needle-shaped rocks from 80 to 100 feet high; and at 8 miles from these is a low projecting point named Farralone.

Perula bay is formed by Flat Top point and a projection of the coast nearly 7 miles north-westward from it, named Rivas. In its north-west corner there is excellent anchorage in 8 to 9 fathoms, sand, but unfortunately it is directly open to southerly winds, which frequently send in a very heavy sea. According to Captain G. H. Richards R.N., whose description of the bay we subjoin, the position of Rivas point is lat. $19^{\circ} 34' 31''$, long. $105^{\circ} 0' 38''$.

"Perula bay, a spacious and convenient anchorage, is easily recognised from any direction by two islands, which lie in the centre of it; the northernmost of which, Passarera, 130 feet high, is remarkable from its perpendicular white cliffs which are seen from a long distance. Colorado, the southern island, is rather lower, and has a slightly reddish appearance. The best anchorage is in the northern part of the bay. The entrance is between Rivas point and Passarera island, and is a mile in breadth; the depth of water from 15 to 18 fathoms.

Rivas point is bold and cliffy, with some detached rocks $1\frac{1}{2}$ cable's length off it, the outer one of which is 80 feet high. From this rock a reef, 2 feet above high water, and on which the sea always breaks, lies East, distant $1\frac{1}{2}$ cables, with deep water close to it. There is anchorage anywhere within a line between Rivas point and Passarera island, in from 10 to 14 fathoms water, but the most sheltered is with the high rock off Rivas point, bearing S.W. by S., distant about $\frac{1}{2}$ a mile, or midway between it and the sandy beach on the eastern side of the bay, where there are 4 and 5 fathoms at $1\frac{1}{2}$ cable's length from the beach. Small vessels may anchor in the northern bight of the bay, and be more out of the swell.

At the south-east end of the bay, nearly 4 miles from Rivas point, is the

village of Chamela. Vessels wishing to anchor near it should enter between Colorado island and the small islands to the south-east of it; this channel is $\frac{3}{4}$ of a mile wide, and free from danger. Large vessels may anchor in 8 fathoms, with the south point of Colorado island bearing S.W. by W., and the village of Chamela just open of San Pedro island, midway between the island and the shore of the bay. Small vessels may anchor in 4 fathoms inside Cocina island, where they will be $\frac{3}{4}$ of a mile from the village; inside this it shoals rapidly, and off the village there is only 1 fathom of water.

From Passarera island a bar extends to the opposite sandy point of the bay, distant $\frac{3}{4}$ of a mile; the least depth of water on it is 8 fathoms, so that vessels of greater draught cannot pass from the northern anchorage to the southern part of the bay, but must go outside the islands. The bottom is sandy, but good holding ground. During the fine season, from November till June, the sea breeze from N.W. is regular during the day, and the land wind at night, and the anchorage is perfectly safe; but with S.W. or S.E. winds a heavy swell sets into every part of the bay.

Supplies of fresh beef, pumpkins, and water-melons may be had at the village, by giving a day's notice; there is also good water from a stream close to it. Dye-wood is exported, but of an inferior quality."

The Coast.—From Rivas point the coast trends N.W. $\frac{1}{2}$ N. about 60 miles to cape Corrientes, and the land throughout is lofty, rising into peaks of 500 to 1100 feet elevation. When sailing down this coast from north-westward, it will be observed that a sandy beach commences immediately southward of the cape. Soundings of 45 to 55 fathoms may be obtained at 9 miles from the land, when 4 miles southward of the cape, and whenever a sandy beach line is met with, a depth of 19 or 20 fathoms water will generally be found within a mile of it, where vessels may anchor if necessary. This coast is not considered safe between June and the end of November, during which time S.E. and S.W. gales are prevalent, bringing in a heavy sea.

CAPE CORRIENTES is a bold and lofty headland, with rather a flat summit, which rises to the height of between 2000 and 3000 feet; hence it is visible from a great distance at sea. Its extreme point is estimated to be in lat. $20^{\circ} 25'$, long. $105^{\circ} 39' 21''$. From northward and westward it does not present a remarkable appearance, but from southward it is bold and projecting. There are no known sunken dangers off it,* and the sea is very deep in its immediate vicinity as the surveyors when 4 miles westward from it failed in touching the bottom, although sounding 106 fathoms.

CAPE CORRIENTES TO CAPE SAN LUCAS,—

INCLUDING THE GULF OF CALIFORNIA.

VALLE DE BANDERAS BAY.—From cape Corrientes the coast suddenly turns to the N.E. by E. $\frac{1}{2}$ E. for a distance of about 28 miles, then

* A sunken rock, named Richmond, has been stated to exist at about 13 miles W. $\frac{1}{2}$ E. from cape Corrientes, and such is inserted in some old charts of this coast, but upon what authority is unknown. As the part in question is constantly traversed by the coasters, who are ignorant of its existence, and the sea is never observed to break there as if over a submerged reef, it is believed that the statement has no foundation in fact; there has been no systematic search for the rock.

trends Northerly 8 miles, and afterwards almost due West about 16 miles to a narrow projecting point of land, known as point Mita; the space included within these limits is the Valle de Banderas bay. From the cape to the point the bearing and distance are N.N.E. 24 miles. Off point Mita are numerous rocky heads, eastward of which, in the northern part of the bay, there is anchorage in from 6 to 8 fathoms. In the eastern part of the bay is the mouth of the river Piginto; and in the western part, at the distance of 4 miles, S.S.W. from point Mita, are two small islets, named Marieta surrounded by numerous rocky heads; and westward of these, at the distance of 6 miles, is a small island, rocky on the western side. The outermost of the islets facing the bay is the Corvetena, a bare rock 25 feet high, situated about 20 miles N.W. $\frac{1}{2}$ N. from cape Corrientes; when seen from southward, it appears as three peaked rocks. The Valle de Banderas bay should be approached and navigated with extreme caution, as it has not been surveyed.

The Corvetena, just mentioned, is estimated to be in lat. $20^{\circ} 44'$, long. $105^{\circ} 46' 80''$. Vancouver describes it as follows, "Much to our surprise, in the afternoon we approached a small black rugged rock, or, more properly speaking, a closely connected cluster of small rocks. The space they occupy does not appear to exceed the dimensions of a large ship's hull, nor are they much higher. They are at a great distance from any land, and, so far as we could perceive in passing them,—at the distance of about $\frac{1}{2}$ a league,—the water near them appeared to be deep in every direction. We could not gain soundings close round them with the hand-line, nor did this small rocky group seem to be supported by any bed of rock or shallow bank. The shores of the main land, eastward of them, at the distance of about 8 leagues, appeared to be broken, and about 10 miles within them are two small islets. These rocks, according to our observations, lie from the southernmost of the Marias, S. 36° E. (*true*), at the distance of 12 or 13 leagues."

The Coast.—From point Mita the coast trends easterly about 6 miles, and afterwards N. $\frac{1}{2}$ E. 34 miles to the mouth of the river Custodios, and includes within it a little bay, named Taltemba, in the northern part of which, and also round its N.W. point to about as far as the mouth of the river Chila, 11 miles from the river Custodios, are numerous rocky heads. The land northward of this latter river runs out westerly about a mile, and forms a small projecting point, from which to Santa Cruz point, the southern point of the roadstead of San Blas, the bearing and distance are about N.N.E. $\frac{1}{2}$ E. 7 miles.

MARIA ISLANDS.—These islands lie before the port of San Blas between latitudes $21^{\circ} 16'$ and $21^{\circ} 46'$, and are three in number,—but four in number, if San Juanito, a large low rock of table form situated about 4 miles northward of the northern island, is included. They are known to the coasters as the *Tres Marias*. Among and around them are many small rocks, whose heads are just above the water.

The northernmost and largest of the islands, *Maria Madre*, is 11 miles long, and about 7 miles broad. It lies in a S.E. by E. and N.W. by W. direction,—which is also nearly the line in which the islands lie from each other. Its height is sufficiently great to render it visible at the distance of nearly 18 leagues. Its highest part is towards the south, whence it gradually descends and terminates in a long low point at its north-west extremity; a small low detached islet named San Juanito, and a remarkable steep, white, cliffy rock, lie off this—the north-west point of the island, whose shores are

also composed, but particularly so on its south-west side, of steep, white, rocky cliffs. Its south-eastern extremity, which likewise descends gradually from the summit of the island, terminates also in a low projecting point, with some rocks lying off from it. On either side is a small bay; that on the eastern side is bounded by a beach, alternately composed of rocks and sand, and very probably good anchorage may be obtained in it, if the bottom should be good, as it is protected against the general prevailing winds. Between this island and Magdalena island, the next to the southward, is a passage about 6 miles wide, with soundings of from 20 to 40 fathoms, sandy bottom, which is believed to be free from sunken dangers.

Magdalena island is about 16 miles in circuit, and is bounded on its south-west side by detached rocks. The shores, in general, but more so on its northern and eastern sides, descend gradually from the centre of the island (whose summit is nearly as high as that of the Maria Madre), and terminate at the water-side in a fine sandy beach. This island is more verdant than the other, as its vegetable productions extend from the more elevated parts to the sea, and grow with some luxuriance, although its soil is principally of a sandy nature. The chief valuable production is *lignum vitæ*; besides which there is an almost impenetrable thicket of small trees and bushes of a thorny nature, together with the prickly pear, and some plants of the orange and lemon tribe; the whole growing as close to the water-side as the wash of the surf permits. A variety of fish, common to the tropical regions, abound about the shores.

Cleopha, the south-easternmost island is only about 2 miles in diameter.

When navigating around these islands, some detached rocks are visible about their shores, but all are sufficiently conspicuous to be avoided; and there is reason to believe, from the regularity of the soundings, that secure anchorage may be obtained against the prevailing winds, at a convenient distance from them.

Of these islands, Captain Beachey R.N. says:—

"The Tres Marias, situated $1^{\circ} 15'$ west of San Blas, consist of three large islands, steep and rocky to the westward, and sloping to the eastward, with long sandy spits. Off the S.E. extremity of Magdalena island (the centre of the group), we found the soundings decreased rapidly from 75 fathoms to 17; and that after that depth they were more regular. At 2 miles from the shore we found 10 and 12 fathoms, bad holding-ground. There is nothing to make it desirable for a vessel to anchor at these islands. Upon Magdalena there is said to be water of a bad description; and the landing is in general very hazardous.

There are passages between each of the islands. The northern channel requires no particular directions; that to the southward of Magdalena is the widest and best; but care must be taken to avoid a reef lying $\frac{1}{2}$ of a mile from its S.W. point, and a shoal extending $1\frac{1}{2}$ miles from its south-eastern extremity. I did not stand close to Cleopha island, but could perceive that there were breakers extending fully $\frac{3}{4}$ of a mile from its S.E. extremity; and I was informed at San Blas, that some reefs also extend 2 to 4 miles from its south-western point. There is an islet off the north-west part of this island, apparently bold on all sides; but I cannot say how closely it may be approached."

SAN BLAS.—The town of San Blas is situated in about lat. $21^{\circ} 32'$, long. $105^{\circ} 16'$. It is seated on the summit of a rather steep hill, and is of

but little commercial importance, the increasing trade of the neighbouring port of Mazatlan having caused the principal merchants to remove thither.* Eastward and westward of it is a stream; that westward of it, known as the Estero del Arsenal, is fronted by a bar of 7 to 8 feet, immediately within which is a depth of 12 to 15 feet, and it is here that small vessels occasionally anchor,—that eastward of it, the San Christoval, is almost dry at low tide. The west point of the Estero del Arsenal has a reef off it, which extends along the coast nearly $\frac{1}{2}$ of a mile in a north-westerly direction; a few of the rocks are above water, and as there are soundings of 2 to 3 fathoms close to the reef some care is required to avoid it when running down the coast in the approach to San Blas from north-westward.

Piedras Islets.—At about $1\frac{1}{2}$ miles from the town of San Blas in the direction of S.W. $\frac{1}{2}$ W., is the rock Piedra de Tierra, which is 55 feet high, and has soundings of 5 fathoms close to it; and at $11\frac{1}{2}$ miles W. $\frac{1}{2}$ N. from this, is the Piedra de Mer, about 180 feet high and 420 feet long, which has a depth of 12 fathoms in its immediate vicinity. As both rocks are white, they are very conspicuous and form useful marks for making the port of San Blas. The Piedra de Mer is in lat. $21^{\circ} 34' 45''$, long. $105^{\circ} 27' 30''$, and is distant 30 miles N. 77° W. (*true*) from mount San Juan, eastward of San Blas.†

The usual anchorage at San Blas is in $4\frac{1}{2}$ fathoms, sand, at nearly $\frac{1}{2}$ a mile eastward of the Piedra de Tierra, or further out in $5\frac{1}{2}$ fathoms at about the same distance south-eastward from that rock. If the former anchorage be preferred, a good spot is at $\frac{1}{2}$ a mile S. $\frac{1}{2}$ W. from the low rocky point of the harbour, with the two Piedras in one. The roadstead is very much exposed to winds from S.S.W. to N.N.W.; hence ships should always be prepared for sea, unless it be in the months in which northerly winds are settled. In the event of the wind veering to westward, and a gale from that quarter being apprehended, no time should be lost in slipping and endeavouring to get an offing, as a vessel at anchor is deeply embayed, and the holding-ground is very bad. In case of necessity, a vessel may cast to westward, and stand between the Piedra de Tierra and the Fort Bluff, in order to make a tack westward of the rock: after which, it will not be necessary again to get northward of a line connecting the two Piedras.

The anchorage should not be frequented between the months of May and December, because, during that period, the coast is visited by storms from southward and westward, attended by heavy rains, and thunder and lightning. It is, besides, the sickly season, and the inhabitants having all migrated to Tepic, no business whatever is transacted at the port.

Approaching San Blas from *southward*, it is recommended to keep westward of the Corvetena rock, already noticed, the islands and rocks eastward of it, which face the entrance to Valle de Banderas bay, not having been closely examined. Approaching from *north-westward*, pass the Piedra de Mer on the south side, and steer thence direct for the Piedra de Tierra, which also pass on its south side; the anchorage will now be reached, and a berth may be

* The town and population had almost disappeared in 1865.

† Mount San Juan is 6230 feet high, and its summit is in one with the Piedra de Mer when on the bearing of E. by S.; it then appears to have two summits, which give it somewhat the shape of a saddle.

selected at convenience. It will not be prudent to go northward of a supposed line connecting the two Piedras, because a shoal is reported to extend a considerable distance from the main land in this direction, to about half way between them, on the *San Blas*, which is a depth of only 2½ fathoms.

It is high water at San Blas on the days of full and change of the moon at 9h. 45m. Spring tides rise about 6½ feet.

Mr. Masters * says "In the rainy season, when the wind blows strongly from southward, a heavy swell sets in at San Blas; and, as there is nothing to protect the anchorage, it must be felt very severely; but I never heard of any damage being done to the shipping in consequence.

There is some advantage in a vessel lying outside in the roads during the rainy season, for there the crew will have purer air to breathe; and, probably, it might be more healthy than that of the port, besides being partially clear of mosquitoes, and other tormentors of the same class, which are very numerous.

There are 18 feet water on the bar of San Blas, in the shallowest part of the entrance, and very seldom less even in the neaps. By giving the point which forms the harbour a berth of 15 or 20 fathoms, you will avoid a large stone, which is awash at low water, and is about 8 fathoms from the dry part of the rocks or breakwater. As soon as you are so far in, that the innermost or eastern part of the breakwater is in a line with the outer part of it inside, which runs to the N.N.E., it may be approached to within 10 or 15 fathoms, and by keeping well off from the low sandy point, which is on the starboard hand as you warp up the harbour, you will have the deepest water. But, as the sea sometimes in the rainy season (although but seldom) breaks over the breakwater which forms the harbour, it would be best to moor close under the high part of the land on which the ruins of a fort stand, with the ship's head up the river, and a bower laid off to the eastward, and an anchor from the starboard quarter, making fast on the port side to the shore, either by taking an anchor out or by making fast to the rocks. It would be next to impossible that any accident could happen to the ship."

The following notes, made on a passage to the port of San Blas, are by Lieut. Sherard Osborn, R.N. :—

"Supposing a vessel, bound to the western coast of Mexico, safely round Cape Horn, and rounding before the southerly gale which almost constantly blows along the shores of South America, she ought to shape a course so as to cross the Equator in about 98° or 99° W. long., so that when she gets the *North-east Trade* she will be at least 6° or 7° eastward of her port,—San Blas or Mazatlan; and have at the same time a sufficient offing from the Galapagos islands to avoid their currents and variable winds.

We crossed in 105° long., having been recommended to do so by some old merchants at Valparaiso, and were consequently, although a remarkably fast-sailing ship, a lamentably long time making the distance. Several days' log of the ship show as follow :—

March 24th	San Blas	672 miles distant
" 25th	"	646 "
" 26th	"	657 "

* Journal of Captain Masters of Liverpool, in the *Nautical Magazine* 1837.

Our track led us to be exactly in the same longitude as our port, when we got the *Trade*, and it hanging well to the northward, we were constantly increasing our distance, until in the latitude of San Blas, when an in shore tack, of course, shortened it. But, by the course I have recommended, the *first* of the North-east Trade will drive the vessel into the meridian of her port, and she will thus daily increase her distance.

Care must be taken when standing in for the land not to go to leeward of San Blas, as there is a strong southerly current along the coast, especially off cape Corrientes. If possible keep San Blas on an E.N.E. bearing. The Marias islands, off the port of San Blas, are convenient points for making; and here a master could leave his vessel in perfect safety to water, while he communicated with his consignees, or got his overland letters from his owners at home. There is a safe mid-channel course between the middle and southern islands;—we brought a saddle-shaped hill on the main, a little south of San Blas, one point open of the south island, and steered by compass N.E. by E.

The two Piedras, are excellent marks for the roadstead, which, by Beechey, is in lat. $21^{\circ} 82' 20''$, long. $105^{\circ} 15' 15''$. A good anchorage for vessels awaiting orders (for which purpose San Blas is now almost alone visited, except by English men-of-war, and Yankee clippers for smuggling purposes), will be found with Piedra de Mer, N. 70° W.; Piedra de Tierra, N. 48° W.; and the village in the Estero, N. 26° W.

Since the days of Hall and Beechey, the town of San Blas has very much changed. Its population of 20,000 has dwindled to 8000 residents, and their unwholesome appearance, fully accounts for the decrease of residents; and nearly all its trade has been transferred to its rival—Mazatlan.

The large town of Tepic, in the interior, with a small factory, owned by an English merchant, causes a small demand for European luxuries, and a cargo or two of cotton; which petty trade is carried on during the six healthy months in the year. A great deal of smuggling is carried on from the neighbourhood of this port, the extensive bay, to the southward, affording great facilities to the men-of-war's boats in that employment.

The town is built on the landward slope of a steep hill, which is almost perpendicular to seaward, and has its crest crowned by the ruins of a custom-house; but as this is about $\frac{1}{4}$ of a mile from the beach, a large assemblage of huts has been formed at the landing-place, in the Estero del Arsenal, for the convenience of supplying the shipping; the occupants being, for the most part, grog-venders, fishermen, and an agent to the harbour-master.

In the Estero del Arsenal, small craft, of less than 10 feet draught, will find convenient anchorage, means of heaving down, &c. The watering-place is, at least, 8 miles from the above anchorage; and to assist the boats in this heavy work, it is always advisable to shift the vessel into such a position that they may make a fair wind off and on whilst the daily sea-breeze blows.

The watering-place is at the northern extremity of a large open bay, south of San Blas; the beach is shoal, and the casks have to be rolled 800 or 400 yards through the jungle to a stream of water. This stream, during the spring tides, is occasionally brackish; but we succeeded in obtaining supplies, by immersing the empty cask with the bung in such a position that only the fresh water (which, of course, would be on the surface), could enter.

By rigging triangles with spars in such a position that the boats could go under them to load, we succeeded in embarking daily 32 tons of water.

Many useful and ornamental woods are to be procured on shore, for the mere trouble of cutting, especially *lignum vite*. Fresh beef we found good in quality. Game moderately plentiful; oysters good and plentiful; vegetables scarce and expensive. The climate may be summed up by the word 'execrable.'

On November 1st, the dry season commences; the temperature rises steadily, and the land yields all its moisture, until, by the month of May, the heat of the atmosphere resembles that of an oven, and the air swarms with musquitoes and sandflies. The sky cloudless, the land and sea-breeze regular, but not refreshing.

Early in June, heavy banks of dark, lowering clouds, charged with electricity, collect on the high lands in the interior, lowering masses of clouds hang to seaward. The change is fast approaching, and before the 10th of June the rains commence and deluge the land, accompanied by heavy squalls and a tumbling swell from seaward. All vessels now leave the coast unless able to take shelter in the Estero; though of late, men-of-war, in eager search for freight, have held on, and found that the gales do not, in the winter, 'blow home.' At this season all the inhabitants, whose means afford it, quit the coast for the interior.

For the first month, or six weeks, the parched land absorbs the rain; but, by the middle of August, it becomes moist and swampy; the haunts of alligators and aquatic birds. In September the action of the sun on water-soddened land, generates fever of the most violent nature, and it behoves those who arrive early in the dry season to be careful of exposure to the malaria."

Isabel Island.—This is a small island, about a mile in length and having two remarkable needle rocks near its eastern side, situated in lat. $21^{\circ} 51' 15''$, long. $105^{\circ} 51' 45''$, or about 40 miles from San Blas in a W.N.W. direction. It is high and steep, and believed to be clear of sunken dangers beyond the distance of a $\frac{1}{2}$ of a mile; but as it has not been closely examined it is advisable to give it a berth of at least 1 mile. The soundings in its immediate vicinity are stated to be 18 to 80 fathoms, the latter being westward of it.

The Coast.—From San Blas the coast trends about N.W. $\frac{1}{2}$ N., 120 miles to Mazatlan, and is throughout low, excepting near the entrance to Tecapan river, in lat. $22^{\circ} 28'$, and covered with trees. It is believed to be clear of sunken dangers beyond a moderate distance from the beach, as the depth south of that river, at a mile out, has been ascertained to be $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms,—and north of the river at the same distance from the land, 6 to 10 and 12 fathoms, fine sand. In the vicinity of Mazatlan the sea is said to be deeper at a corresponding distance from shore than it is near San Blas.

The Tecapan is barred, and we believe can be entered only by boats. Northward of the Tecapan river is another named Chamatla, in lat. $22^{\circ} 51'$, on the bar of which there is usually a depth of 4 feet at low tide, and this increases within to 6, 9 and 12 feet; hence it can be entered by vessels of very light draught only at high water. The country behind the Chamatla rises into lofty hills.

When beating up the coast between San Blas and Mazatlan, the lead should be frequently hove as the soundings are an excellent guide and give a good indication of the near vicinity of the land. Some of the low hills upon the shore, 27 miles from Mazatlan, are shaped like cones. The current has a southerly set, at the rate of 18 to 20 miles per day, but its direction and velocity are much affected by the prevailing wind.

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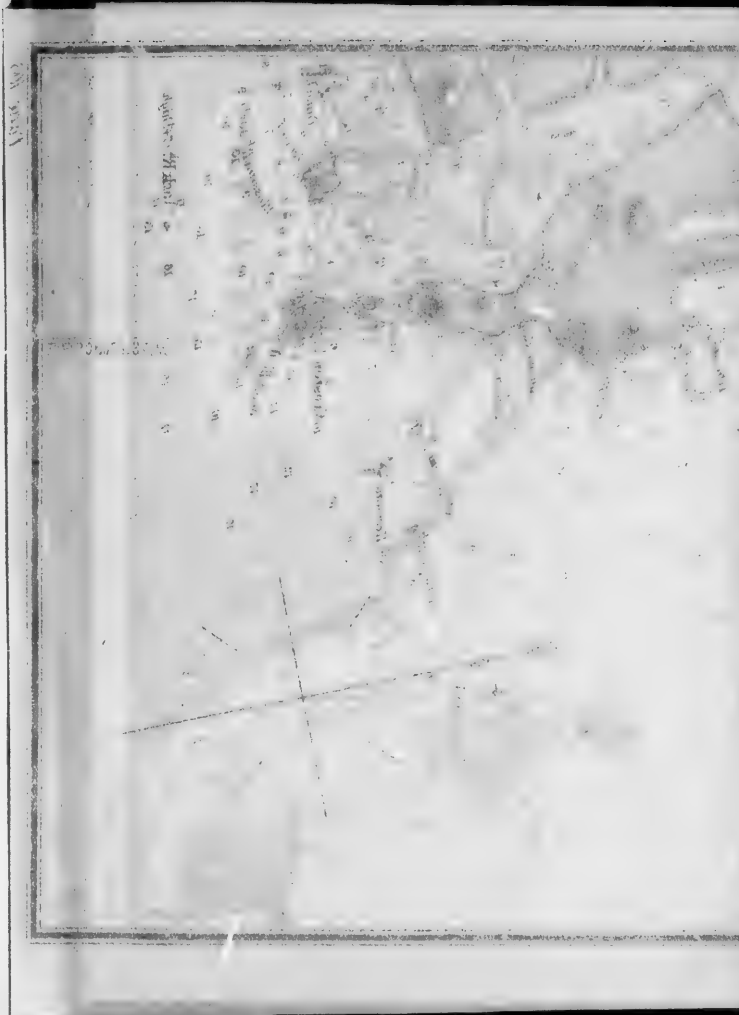
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MAZATLAN.—The river Mazatlan is about $\frac{1}{4}$ of a mile wide at the entrance, and so very shallow that it can be entered only by small vessels at high tide. The sands are nearly all dry at low water, at which time the depth over the bar is only about 2 feet, and in the channel within 9 to 12 feet. Fronting the river are some islands of considerable height, by which the locality of the port can be recognised from a distance. The town is on the west bank. Shipmasters bound to the port should be provided with the Admiralty chart by Captain Beechey, R.N., (No. 1876), and to this chart we must refer our readers, as a written description will not convey so good an idea of the port as an inspection of the chart.

Captain Beechey says, 1828 "The anchorage at Mazatlan, at the mouth of the gulf of California, in the event of a gale from south-westward, is more unsafe than that at San Blas, as it is necessary to anchor so close to the shore, that there is not room to east and make a tack. Merchant-vessels moor here with the determination of riding out the weather, and for this purpose go well into the bay. Very few accidents, however, have occurred, either here or at San Blas, as it scarcely ever blows from the quarter to which these roads are open between May and December.

Having approached the coast in about the latitude of $23^{\circ} 11'$, Crestin and some other steep rocky islands will be seen. Crestin is the highest of these, and may be further known by two small islands northward of it, having a white chalky appearance. Steer for Crestin, and pass between it and a small rock southward of it, and when inside the bluff, luff up, and anchor immediately in about $7\frac{1}{2}$ fathoms, the small rock about S. 17° E., and the bluff W. by S. Both this bluff and the rock may be passed within a $\frac{1}{4}$ of a cable's length; the rock has from 12 to 15 fathoms within 80 yards of it in every direction. It is, however, advisable to keep at a little distance from the bluff, to escape the eddy winds. After having passed it, be careful not to go much northward of the before-mentioned bearing (W. by S.,) as the water shoals suddenly, or to reach so far eastward as to open the *west* tangent of the peninsula with the *eastern* point of a low rocky island S.W. of it, as that will be near a dangerous rock, nearly in the centre of the anchorage, with only 11 feet water on it at low spring-tides, and with deep water all round it. I moored a buoy upon it, but should this be washed away, its situation may be known by the eastern extreme of the before-mentioned low rocky island (between which and Battery peak, there is a channel for small vessels) being in one with a *wedge-shaped protuberance* on the western hillock of the northern island (about 8 miles north of Crestin); and the N.W. extremity of the high rocky island eastward of the anchorage being a little open with a rock off the mouth of the river in the N.E. The south tangent of this island will also be open a little (4°), with a dark *tabled hill* on the second range of mountains in the east. These directions will, I think, be quite intelligible on the spot.

The winds at Mazatlan generally blow fresh from the N.W. in the evening; the sea-breeze springs up about 10h. in the forenoon, and lasts until 2h. in the morning.

It is high water at this place at 9h. 40m., full and change; spring tides rise 7 feet."

The following notes made on a passage from San Blas to Mazatlan, are by Lieut. Sherard Osborn, R.N., "Leave San Blas with the first of the land breeze, and after passing Piedra de Mer, endeavour to steer such a course as to be enabled to make a good in-shore tack with the sea-breeze on the morrow,



taking care not to stand closer to the shore than 8 fathoms in a large vessel, or 5 fathoms in a smaller one; or, should the sea breeze be found to have much northing, stand well off, when a continued wind instead of the land and sea-breezes will be obtained, and the strong southerly set in-shore be avoided. The *Collingwood* made the in-shore passage in April, 1846, and had light airs with frequent calms, being generally too far off shore at night to benefit by the land breeze; she consequently was five days going 120 miles, whilst the *Spy* did it in two and a half days by going well to seaward.

The *misnamed* port of Mazatlan is easily recognised by the two bluff headlands which form the entrance to the river, the northern and more conspicuous of the two, Crestin, being an island, and affording a little shelter from the northerly breezes which prevail from January to May. To the westerly and southern breezes it is perfectly open, and has the only recommendation of being good holding ground. The coasters run up the river off the new town of Mazatlan, which has risen to considerable importance within a very recent period, notwithstanding the disadvantages it labours under from the paucity of supplies, both animal and vegetable; and from water being both bad and scarce.

Mazatlan is now the outlet for the products of the valuable mining district of San Sebastian, and imports directly and indirectly large cargoes of English goods. The general healthiness of the climate, as compared with its more ancient neighbour San Blas, has materially tended to an increase of its population. The town, from being built on the crest of some heights, clear of mangrove and swamp, had an air of cleanliness and pure ventilation rare in this part of America.

Vessels must invariably moor in the roadstead, open hawse to the W.S.W.; and too close a berth to Crestin island is not advisable, as the squalls sweep over it with great strength. The *Collingwood* drove, though she had 50 fathoms on each cable.

Watering is attended with great risk at all times at this place, especially at full and change, the boats having to cross the heavy surf of the bar, formed between a long spit which runs down the centre of the river, and a bank joining it from the south shore. Several boats and lives are annually lost here. When pulling in care should be taken to cross the surf pretty close to the middle ground; and when through the first rollers, to pull over to the south shore, and keep it on board up to the watering place. In coming out, no casks ought to be allowed in the head sheets, everything depending upon the buoyancy of the boat; inattention to this point, caused the loss of two lives, to my own knowledge.

The water is procured from a number of wells dug by seamen, on a low alluvial island, formed on a quicksand in the bed of the river; none of them are consequently more than 10 feet deep. The water is by no means sweet, being merely sea water, which undergoes a partial purification in filtering through the soil.

Supplies of all sort come from the neighbourhood of San Blas; and as the bullocks are driven that long distance, and as on arrival they are instantly killed, from the want of grass, the beef is necessarily lean and bad. Pork, fish, and oysters are however plentiful; vegetables are scarce. The river abounds in turtle of excellent quality; wood of various descriptions, principally hard, was plentiful, and at a short distance oak and cedar might be obtained.

Old Mazatlan, which lies about 20 miles up the river, was well known to

ancient navigators, as far back as 1587. "Master Thomas Cavandish in the tall shippe *Desire*, 120 tons, refreshed his gallant company before cruising off cape Lucas, for a Spanish galleon; and Don Sebastian Vizcaino, in an expedition to convert the Californians to the Catholic faith, recruited his squadron in the Bahia de Mazatlan."

The Coast.—The westernmost of the rocky islets off the entrance to Mazatlan river are named Hermano; at $8\frac{1}{2}$ cables' length westward of these is a rock, known as the Tortuga, which has a depth of 9 to 12 fathoms close to it. The soundings between these islets and Crestin island are 6 and 7 fathoms.

At rather more than 8 miles north-westward from Crestin island is an island named Venado, of irregular shape, and distant about $\frac{1}{2}$ of a mile from the shore to which it is joined by a flat of $2\frac{1}{2}$ fathoms. Venado is not so lofty as Crestin, but has a very similar appearance, and both islands can be seen from seaward a considerable time before the land behind the towers of Mazatlan comes into view; hence they are good marks when approaching the port directly from southward. An island, named Paxaros, lies about a mile N.N.W. from Venado, and is also connected to the shore by a flat of $2\frac{1}{2}$ fathoms or less.

All the coast within the islands just mentioned, Venado and Paxaros, is low and sandy. The low beach commences at the bluff point of Mazatlan river, and extends to some miles north-westward from the islands, but how far has not been ascertained, the coast northward of Mazatlan not having been surveyed. Until the Mazatlan river was constituted a port, it was usual to land cargoes on the beach between the river and Venado island; the risk was however very great, the anchorage being exposed to the full force of the south-west winds.

Panama Rock.—A rock, awash or nearly so, is inserted in the Admiralty chart No. 2828, in about lat. $28^{\circ} 15'$, long. $106^{\circ} 34'$, or 10 miles W.N.W. from Mazatlan. The American steamer *Panama* is reported to have struck on it in 1864. It is said that there are breakers over it at low water when the sea is high. No further particulars of it are known.

Piastla River.—From Mazatlan the coast trends N.W. $\frac{1}{2}$ W. 74 miles to Piastla river and is entirely unknown, but believed to have a depth off it at a moderate distance of 5 to 7 fathoms. The entrance to this river is in about lat. $24^{\circ} 10'$, long. $107^{\circ} 15'$, and is barred. From it two remarkable peaks in the interior are stated to bear N.E. $\frac{1}{2}$ N., and these are asserted to be a good mark for the roadstead in the offing. We possess no description nor particulars of this river, and only know that it is occasionally visited by small vessels for Brazil wood. The lead should be freely hove when in its vicinity.

ALTATA.—From Piastla river to the river Culiacan, the entrance to which is in about lat. $24^{\circ} 40'$, long. $107^{\circ} 55'$, the coast (entirely unknown) trends N.W. by W. 48 miles. Altata, a village near the north side of the river, is visited by small vessels for Brazil wood. The Culiacan is barred, and facing it are some shoals which it is said extend out fully 10 miles from the land. The river has not been surveyed. The following instructions for Altata are very imperfect, and are added because they may be of use in the event of the services of some one having a knowledge of the locality not being obtainable;—a pilot should be got if possible.

Captain G. H. E. Horn of the Hamburg barque *Colima*, 1860, says* "As

* *Mercantile Marine Magazine*, Vol. for 1860.

it is difficult to recognise the locality of Altata, particularly in the dry season, a coaster with a dull craft, well acquainted with the coast, may possibly make a quicker passage than a stranger in a fast clipper. Leaving Manzanilla in the dry season, which is best done with the land breeze, it is advisable to make long tacks and carry as much canvas as possible to stem the current, not doubling cape Corrientes too closely, the current there being very strong. Having reached the parallel of 21° , stand in for the coast, and make the land in the vicinity of Piedra de Mer, in order to anchor, if it should fall calm, as it generally does at night. In the *Colima* (350 tons) we brought up with the small kedge ($2\frac{1}{2}$ cwt) and a 5 inch warp. The depth of water between Tecapan river and Mazatlan, at about a mile from shore varies from 9 to 12 fathoms; there are no known dangers but what are visible, the lead showing the distance from the land;—the vessel, beating to windward, should never leave anchoring ground, as the current runs southward at a rate of 80 to 40 miles in 24 hour and it would in a calm, drift back a considerable distance.

On leaving Manzanilla in the rainy season, a passage to Altata is very easily made, carrying a fair wind all the way; but in the dry season when the N.W. wind is blowing, much difficulty is experienced, as strong winds and currents are against you at that time. It is advisable to hug the Mexican coast, in order to anchor, in case it should fall calm, as it generally does at night;—by standing out of anchoring ground it is probable that the vessel will drift back in the calm, nearly as much distance as was gained when beating up. On the passage, sight will be obtained of the Sierra de San Sebastian, the position of which, assigned to it on the charts from the Spanish survey, may be depended on. Having approached about lat. $24^{\circ} 39'$ or $24^{\circ} 40'$, long. $108^{\circ} 10'$, the saddle-shaped hill of Tamasula will bear N.N.E. $\frac{1}{2}$ E. and the vessel will then be W. by S. from the anchorage, distant 7 miles. Steer E. by N. and anchor as soon as in 8 fathoms water, muddy bottom. On steering for the anchorage of Altata, if the lat. of $24^{\circ} 35'$ be passed, take care not to approach the shore too much, as there are reefs stretching out several miles to the southward. It is by no means safe to anchor too near the shore. In case it should come on to blow it is requisite to slip anchor and stand out to sea until the weather moderates. The filling and procuring water at Altata is difficult and expensive; it cannot be done with the ship's boats and crew, but it is necessary to employ men from shore, who fetch it in small kegs on mules from a plain inland where it is dug for. Thirty hogsheads cost me while I was there \$20, and \$80 more for bringing on board.

The position of the anchorage, from good observations, is lat. $24^{\circ} 41' 42''$, long. $108^{\circ} 8'$ determined by 84 chronometric sights corresponding with four lunar distances. Position of Altata distant 5 miles, E. $\frac{1}{2}$ S., lat. $24^{\circ} 40' 12''$, long. $107^{\circ} 57' 41''$.

By attending to the following directions, a shipmaster unacquainted with the place will be enabled from the roadstead to find the boat-channel leading to Altata. From the anchorage, a conspicuous white house in Altata will bear E. $\frac{1}{2}$ S., this is also the bearing of the bar from the boat channel, which lies beyond a low lagoon island, the N.W. extreme of which has to be rounded to gain the entrance. From the anchorage steer for a white sandy height, westward of Altata; as the surf is approached you will perceive, a little westward of several small hillocks forming a part of the above mentioned height, the trunk of a broken tree, which must be brought on the starboard bow, and standing on in that direction smooth water will be seen through the surf.—

Run in till within a boat's length of the beach, when the rollers will be passed, after which turn along the beach towards Altata river; further directions are now unnecessary, the eye being the best guide. Should the broken tree be sanded over or taken away, it will be difficult for a stranger to find the boat-channel, and it is then recommended to steer direct for the white sandy height, and wait at the back of the surf until, as is commonly the case on the arrival of strange vessels, some person on shore by motions points out the entrance."

Captain Clemenceau says of this river,* "The anchorage of Altata is in lat. $24^{\circ} 42'$, and a little north of the entrance to the river Culiacan. When approaching it from seaward, the first land seen is the mountains of Agua-pepe, which are situated some miles in the interior of the country; these present four detached summits, and it is the most northern of them that has to be kept in view when running for the land,—it should be kept eastward of N.N.E. in order to avoid the banks southward of the anchorage, which are said by the coasters to extend 8 miles to seaward, but this distance there are reasons for believing is exaggerated.

As all this coast is excessively low, it would be impossible at night to see any part of the shore before striking on the banks just alluded to; hence the lead must be freely hove, especially if there be reason to suspect that the vessel is in their proximity. The soundings are an excellent guide, and it is recommended not to get into a less depth than 15 or 18 fathoms.

The coast at the anchorage trends S.E. and N.W. inclining a little to westward. At a little more to the north it forms a point known as point Baradeta, off which are some shoals which extend out a considerable distance, perhaps 5 or 6 miles. The anchorage of Altata is between these shoals and others situated 4 miles to the southward.

The fine season for visiting this coast commences in November and continues till June. During this time, vessels are in complete security."

The Coast.—From Altata the coast trends 90° or 95° miles in a W.N.W. direction to Ignacio point, situated in about lat. $25^{\circ} 41'$, long. $109^{\circ} 26'$.† It is almost entirely unknown, but is said to receive the waters of several rivers, of which that named Sinaloa in about lat. $25^{\circ} 28'$ is probably the most important; facing this river is an extensive shoal, and its north shore is conspicuous by a white rocky point. Near all this shore there is probably a channel for coasters.

Ignacio point is represented in the charts as having a reef from it to the distance of 3 or 4 miles, close around which are soundings of 8 to 17 fathoms. At about 13 miles almost due South from it, is a small rocky island (perhaps $1\frac{1}{2}$ miles long) of the same name which rises to the height of about 200 feet, and is the resort of numerous seals, sea-lions and birds; its position is about lat. $25^{\circ} 27'$, long. $109^{\circ} 27'$, and its situation in the gulf makes it a prominent object to such vessels bound northward as may get too far over to the eastern shore.‡

* *Annales Hydrographiques*, Vol. for 1858.

† The positions here given for Ignacio point and island may be about 5 miles too far westward. We would here observe that very little is known of the hydrography of the gulf of California, and that its eastern shore especially is represented to be low and dangerous, upon which account the greatest attention to the lead is necessary when standing towards it.

‡ Captain A. H. Wilcox, of the U.S. Transport *Invincible*, in his exploring voyage up the gulf in 1850 to survey the entrance of the Colorado river, made Ignacio island in lat. $25^{\circ} 39' 30''$, when it appeared to be about 5 miles long and 2 or 3 miles in width.

From Ignacio point to Guaymas, upwards of 150 miles distant in a direct line to the north-westward, the coast is almost unknown, and as it is said to be very low, with but few objects sufficiently prominent to be seen from a distance, the utmost care is necessary when approaching it. It is believed to be fronted throughout by an extensive bank, which shoals gradually to the land, and it is asserted that the soundings (with the exception perhaps of the immediate vicinity of Guaymas, where the depth close off cape Haro is 40 to 45 fathoms) are generally a good indication of its proximity.

A small harbour, named Jiabampa, situated in about lat. $26^{\circ} 16'$, long. $109^{\circ} 18'$, is reported to have a depth of 8 fathoms on its bar, and 6 to 7 fathoms at the anchorage inside. At nearly 80 miles northward of this harbour is the outlet of the river Mayo, which is fronted by a bar; all the shore in the vicinity of this river is very low, and Mr. Allan of H.M.S. *Conway*, 1835, particularly mentions that he tacked off some very low land in lat. $26^{\circ} 52'$, about long. $109^{\circ} 35'$, ($4^{\circ} 16' 33''$ W. from San Blas), and that no high land was to be seen behind it, but some very lofty hills were visible to the E.N.E.

Lobos point, placed by Mr. Boxer R.N., in lat. $27^{\circ} 17'$, long. $110^{\circ} 39'$, is very low and dangerous; hence the greatest circumspection is necessary when in its vicinity, and allowance should be made for the south-easterly current which flows past it, usually with considerable strength. From Lobos point to Guaymas the distance is nearly 40 miles.

GUAYMAS, the most important harbour in the gulf of California, is situated on the north-east side of a hilly peninsula, of which cape Haro 5 miles South (true) from the town, is the extremity. Cape Haro by Capt. Kellett's observations is in lat. $27^{\circ} 50' 30''$, long. $110^{\circ} 51' 40''$. The harbour is about 8 miles in extent, is protected by several islands, and has a depth of 6 to 2 fathoms, the latter being immediately off the town. The outermost island, Pajaros, is 212 feet high, and connected on its northern side to a low sandy neck of land, the Playa de los Dolores, by a shallow flat of 15 feet; the proper passage into the harbour for large vessels is consequently westward of this island, between its southern end and the coast, through a channel $\frac{1}{2}$ a mile wide and about 6 fathoms deep. When within, vessels are sheltered from all winds, and anchorage may be selected according to the ship's draught of water. It is high water on the days of full and change of the moon at 8h. and the rise of tide is 4 feet, but dependent upon the winds which sometimes increase it to 10 and 12 feet.

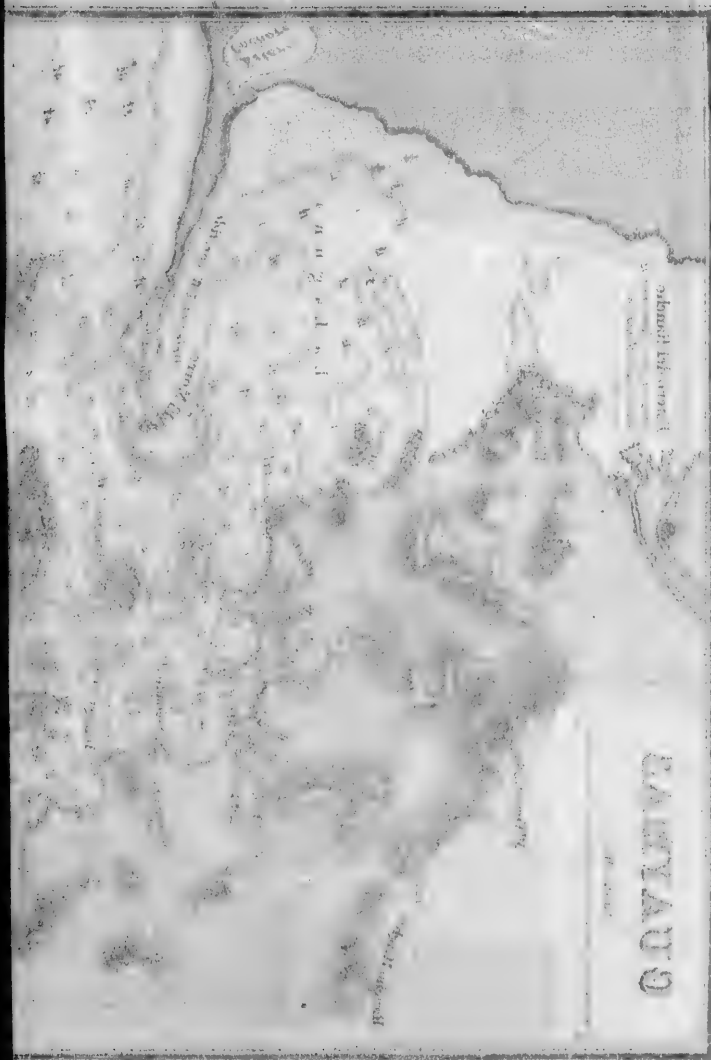
Some of the hills immediately over the town are lofty, of these mount Vigia, having an estimated height of 1585 feet, is considered to be the highest. Mount San Rafael over cape Haro is probably 1816 feet high.

Guaymas was visited in 1850 by Captain A. H. Wilcox, of the U.S. Transport *Invincible*, who anchored in $4\frac{1}{2}$ fathoms; his remarks on the harbour are as follows. "The harbour is one of the best upon the coast; it is perfectly land-locked and protected by its numerous islands from every quarter. It has been so often and so well surveyed, that it is unnecessary for me to enter into a minute description of its merits. It is to be regretted, however, that it has not more water, from 4 to 5 fathoms being the average depth, which is insufficient for a ship of the line, or even a first class frigate. We found Guaymas a dirty place, with a dirty population of about 1500 or 2000. The houses being built of *adobe* with the roofs sloping towards the interior, have a very unfinished appearance, and from the harbour the town presents the



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appearance of having been abandoned when half built. There are two small piers in a ruined condition; and near the landing a large pile of earth, surmounted by two or three crumbling walls, over which floats from a lofty staff the flag of Mexico, marks the site of the *adobe* fort knocked down by the guns of the *Dale* during the late war. There are several wealthy individuals in Guaymas, who monopolize the whole of the business with the interior of Sonora, but the mass of the population are in a state of wretched poverty. One or two small vessels from San Francisco were lying in the harbour, the proprietors of which had purchased everything in the shape of fresh provisions to be obtained. Sheep in large numbers they had purchased from the interior of Sonora with the intention of landing them at Molexe, on the California coast, thence driving them overland to San Francisco. Fowls, turkeys, ducks, goats, everything that could be purchased for one real and sold for twenty had disappeared, causing us no little difficulty in obtaining fresh provisions, even at comparatively high prices. The water at Guaymas is obtained from wells, and is slightly brackish. Excellent oysters are brought from the river Yaqui, which empties into the bay about 20 miles south of the town, and sold to the shipping at a dollar a bushel; the Mexicans, however, make no use of them.

The time of high water at full and change of the moon at Guaymas is not very accurately determined; it is, however, between 8 and 9 A.M. The ordinary rise of spring tides is 6 feet, neap tides 4 feet. The phenomena of four tides in 24 hours has repeatedly occurred here, as we are credibly informed. The prevailing winds in May, June and July, are from the South-east and South-west. The thermometer during the summer months ranges from 92° to 98° Fahrenheit, the maximum 119°; during winter from 56° to 80°, minimum 45°. Guaymas is in lat. 27° 54', long. 110° 49' 10".*

The description of Guaymas by Lient. Hardy, R.N., 1826, applies to the town with equal force at the present time. He says "The harbour is, beyond all question, the best in the Mexican dominions; it is surrounded by land on all sides, and protected from the winds by high hills. It is not very extensive, nor is the water above 5 fathoms deep abreast of the pier; but there are deeper soundings further off. It would shelter a large number of vessels. The entrance is defended by the island Pajaros, on which, at the proper season of the year, is found a prodigious quantity of eggs, deposited by gulls, so that its surface becomes completely whitened by the vestiges which they leave behind them.

During the dry season, the hills surrounding the harbour present a sterile appearance, truly displeasing to the eye, and give but a bad idea of the prosperity of the town; while the size of the houses, the number of its inhabitants, or the want of cattle in its neighbourhood, do not tend to remove that impression.

The town is but a miserable place, that is, as far as regards the houses, which are built of mud, having flat roofs, covered with mould, so that, during a hard rain, the inmates may take a shower-bath without going out of doors. The rafters are whole palm-trees; and there is a large kind of humble-bee which perforates them with the greatest ease, so that, by degrees, these *great bores*, which serve the insect for a nest, so weaken the rafters, that the lodger

* This almost exactly agrees with the observations of M. Fisquet of the French corvette *La Danaide*, 1840, who places the island Almagrito, opposite the town, in lat. 27° 58' 50", long. 110° 49' 26".

may sometimes find a grave without going to the churchyard, the roof falling for want of due support, which has since happened to every house wherein we then resided."

The Coast.—The gulf of California northward of Guaymas is but little known, and very few foreign vessels ascend it higher than that port; the only particulars of it that we are able to give are by Captain Wilcox, U.S. Navy, 1850, whose remarks we subjoin.* In this part of the gulf the currents are said to set with the wind during the prevalence of the 'northers', from the latter end of October till the month of May. The tidal influence is also felt as far as its head, the river Colorado. Southerly winds commence at about May, and almost always cause a strong current, influenced, however, very much by the locality.

Captain Wilcox says "We sailed from Guaymas on Friday, the 6th December, 1850, and for three days experienced a very heavy gale from the N.E., again it which the vessel struggled under double-reefed sails without making much progress northward. We passed the small islands of Nolasco, situated about 20 miles west of Guaymas, on the 6th, and on the 7th were within 10 miles of the island of Tortuga, bearing from us S. 4° W. This island is about 6 miles in length, and like most others in the gulf appears rocky, barren, and uninhabited by animals.

The violence of the wind abated on the 8th, and on the 9th we found ourselves off the large bay represented on the chart as lying between capes Trinidad and San Miguel, on the California shore. Here we observed with glasses a very extensive plain, covered with cactus. On the 10th we passed the island of San Pedro Martyr, the longitude of which we determined to be $111^{\circ} 54'$. The island is a barren rock, about 5 miles long, situated nearly in the middle of the gulf. Far beyond, to the north-east, we saw the rugged outline of the celebrated island of Tiburon. This island has long been known as the abode of the Ceres Indians, a small tribe of about 500, who are represented as extremely hostile, and invariably opposing any attempt at landing; they are said to be armed with poisoned arrows. A rich bed of pearl oysters is said to exist between this island and the coast of Sonora, and there are accounts of rich gold mines upon the island; but as no one is ever known to have landed there, it is difficult to understand how the fact was ascertained. We should have landed and attempted an examination of the island, but the wind being contrary compelled us to lay over to the California shore, and we passed it in the night.

San Estevan Island.—On the 11th we passed the island of San Estevan, which presents an exceedingly wild and sterile appearance, resembling the generality of the gulf coast on the California side. The appearance of the water between this island and that of San Lorenzo led us to suppose that we were on soundings, but on trying the deep sea lead we found no bottom at 100 fathoms.

On the 12th we passed near three small islands (southward of the large island of Angeles,) which are not put down on the chart, and of which we had no previous information. They are composed of coarse clay slate, coloured trap, and trap tuffa, and covered with cacti. Immense quantities of seals are found upon these, as well as most of the other islands in the gulf. I named this group Allen's islands, as a compliment to Major Robert Allen,

* See *Mercantile Marine Magazine*, Vol. for 1866. This work is strongly recommended to Navigators as being the only publication (issued monthly) which confines itself to Nautical matters.

chief quartermaster of the division. The latitude of the group is about $28^{\circ} 55'$, longitude $112^{\circ} 40'$, and the soundings in the vicinity from 4 to 17 fathoms.

Angeles Island, which we also passed on the 12th, is separated from the California shore by Whale channel, which is about 10 or 15 miles wide. The island is about 80 miles in length, mountainous, rocky, and uninhabited; it lies between latitudes $29^{\circ} 10'$ and $29^{\circ} 50'$, and in longitude about 118° .

We had received information in Guaymas of a small bay somewhere upon the California coast, in this vicinity, where fresh water could be obtained, and on the 18th, having rounded the northern extremity of Angeles island, we ran before the wind down Whale channel (where we observed a southerly current of about 8 miles per hour) in search of it.

We discovered a large island close to the California shore, off the southern extremity of Angeles island, in lat. $29^{\circ} 8'$, long. $112^{\circ} 59'$, which, not being put down upon any chart, I named Smith island, in compliment to the General commanding, by whose order the expedition was undertaken. This island is about a mile north of Angeles bay, which we found and entered on the 14th. This is a small indentation in the coast, about 4 miles in width, slightly open to the eastward, with a sandy bottom in about 10 fathoms water. The adjacent country is extremely wild and rugged. The hills are covered with high boulders which are coarsely aggregated masses of quartz, mica, and feldspar, and I noticed several isolated blocks of grey granite and sienite. There are three springs of slightly brackish water at the foot of the highest hill, and a bed of most excellent oysters is exposed at low tide. The water may be found by noticing the reeds which grow about it, and which are the only green things to be seen in the vicinity.

The deep and rugged channels running down the sides of the mountains, and the immense pile of boulders forming their sides, would seem to indicate that at certain seasons of the year great quantities of water must fall here; but at the time of our visit everything appeared dry and parched. There are many varieties of cactus in the vicinity, but no nourishing herbs or grasses, and we saw no traces of game, but a few tracks of coyotes and wild goats near the spring. The bay is probably well known to the people inhabiting the interior, as we found many traces of old encampments, piles of oyster shells, heaps of ashes, and many mule-tracks leading to the southward. There are plenty of turtle in the harbour, but we did not succeed in taking any.

We remained at Angeles bay until the 18th, when, having filled our water-casks, we weighed anchor and stood out into Whale channel. It being low tide we noticed several sunken rocks at the entrance, which we had not perceived on coming in. The rise and fall at Angeles bay is about 15 feet. Its latitude is $28^{\circ} 5'$, longitude $118^{\circ} 25' 30''$. We had rain on the 19th in squalls, and on the 20th a gale from the north-west, against which we steadily beat up for the head of the gulf. On the 21st we sounded when about 5 miles from the California shore, and found the depth from 20 to 25 fathoms. On the 22nd we passed within 4 miles of a very remarkable rock, which at a distance has the appearance of a ship with all sail set. I named it Ship rock, but am inclined to think it identical with Hardy's Clarence island, although 20 miles westward of the position in which he lays it down. We sailed over the latitude and longitude of his Clarence island, but saw nothing of it. Ship rock is apparently a mile in circumference, about 200 feet in height, and perfectly white with guano. We sounded continually on the 22nd, and

found a depth of 20 fathoms, with a sandy bottom. In the afternoon we observed a column of smoke in the distance, bearing N. 60° W., which we afterwards ascertained to be caused by the Indians burning reeds on the river Colorado. On the 28rd the land was plainly discernible on both coasts of the gulf; on the California side bold and mountainous, but on the Mexican low and sandy.* Sounding continually, we found but about 18 fathoms water, and we noticed constantly masses of reeds, trunks of trees, &c., floating past us, and at 6h. p.m., the wind having died away, we dropped anchor in 6 fathoms water. We found by throwing the log, a current setting southward about 1½ miles per hour. The soundings from the 21st had shown us that the bottom was a fine blue pipe-clay, which (mentioned by Hardy) indicated our approach to the mouth of the river. On the 24th we weighed anchor and ran over to the California shore, the water shoaling gradually from 6 fathoms to 10 feet, and at night we anchored between Montague island (which we readily recognised by Hardy's description,) and the main land. The country here is low, flat, and covered with dwarf reed and coarse grass. Thousands of trunks of trees lie scattered over its surface as far as the eye can reach, showing that it must be entirely overflowed at the season of freshets.

River Colorado.—We landed on the 26th, both on Montague island and the main, and found the soil clay detritus, and the vegetation scanty. The two islands situated in the mouth of the river, called by Hardy, Montague and Gore, are low, flat and sandy. They are separated by a channel about 1 mile in width, and extremely shallow. They are evidently formed by the accumulation of the sand and detritus from the river, and are gradually increasing in size. We commenced the survey of the river upon the 25th, which we continued from day to day as we ascended. On the 27th, by taking advantage of the tide, we had succeeded in reaching Unwin point, off which we anchored. The log gave us at this point a current at ebb tide of 4½ miles per hour, which we found to be the average velocity, except at spring tides, when it is much increased.

On the 28th we left our anchorage at 7h. a.m., and beat up with the flood tide until about 9h., when we grounded off Charles point. The soundings had been from 1½ to 8½ fathoms. At this point we found the water devoid of any brackish taste, but extremely muddy, resembling in its character that of the Mississippi river. We continued daily up the river, sounding the channel at low water, and marking it by stakes, starting with the flood tide and floating with it until the ebb set in, when we anchored and went on shore to continue the survey. The shores of the river (here from 2 to 4 miles wide) continue of the same character, the grass growing somewhat more thickly as we ascended, however, and upon Greenhithe point, off which we anchored upon the 1st of January, we found a thick growth of *artemisia*. We had experienced no little difficulty in crossing from Charles point to Greenhithe point; the channel is extremely narrow, and nearly at right angles to the direction of the river, and we had twice been swept from it by the tide, and grounded upon the bank above. Upon the 1st, however, we were favoured with a strong breeze, taking advantage of which we soon crossed and anchored

* The coast on the western side of the entrance to the Colorado, for a very considerable distance before reaching the river, appears to be composed of a loose sandy soil, easily raised by the wind. It has, in consequence, been named 'Smoky Coast.' Lieut. Hardy, R.N., 1826.

noon we which we the river the of the can low water, ing past anchor in outhward us that indicated chor and fathoms which we e country thousands an reach, d and the The two tague and out 1 mile accumula-increasing which we advantage anchored. per hour, when it is h the flood soundings er devoid of eter that of the channel ed tide and on shore to miles wide) e thickly as we anchored . We had Greenhithe agles to the e tide, and ere favoured and anchored

in the channel upon the southern side. We landed upon Greenhithe point, (formed by two small indentations in the crumbling clayey bank,) and found the land on the south bank to be a perfectly level plain, (the soil clay detritus,) extending to the south and west for miles, and intersected by numerous sloughs, apparently filled by every spring tide. The river westward is bounded by the high hills of the Lower California chain, at the distance apparently of 15 or 20 miles. Trunks and limbs of large trees, some recently deposited, others in an advanced state of decay, are thickly scattered about, evidently left by the spring freshets. The river bank is abrupt, and about 20 feet in height; the water is gradually undermining it, and large pieces are continually dropping off, falling into the water with a sound as loud and not unlike the distant report of a musket. We discovered two new islands in the reach above Greenhithe point; they are low and sandy, separated by a small channel and covered with coarse grass; they have undoubtedly been formed within a few years. The bed of the river is filled with quicksand, and its current at the time of spring tides is so strong that the channel is continually changing. I named these islands Gull and Pelican respectively, from the numerous flocks of these birds continually hovering or afloat in their vicinity. We discovered the remains of a rude Indian hut near the shore, and observed many tracks of horses in the vicinity. During the night of the 1st the vessel grounding at ebb tide, swung around upon her heel, and thumping violently was carried by the tide (dragging her anchor) some 2 or 3 miles, grounding finally upon the shoal of Gull island; at flood tide sail was made on her as soon as she floated, and we succeeded in getting her back into the channel. As the vessel grounded at every ebb tide, and on the return of the water was violently swung around, thumping on her bottom, and swinging on her anchor, I began to see that it would be neither prudent, or in fact possible, to ascend the river much higher, and we accordingly commenced making preparation for a boating expedition; the tides were now on the increase and on the 2nd I observed, with the log, the velocity of the current at ebb tide to be $5\frac{1}{2}$ miles per hour. We observed on the 2nd, for the first time, the singular phenomenon of the tide coming in, in a bore or wave, while the ebb was still rushing past the vessel towards the Gulf. On looking in the direction of Greenhithe point, a bank of water some 4 feet in height, extending clear across the river, was seen approaching us with equal velocity; this huge comber moved steadily onward, occasionally breaking as it rushed over the shoals of Gull and Pelican islands; passing the vessel, which it swung around on its course, it continued up the river. This phenomenon was of daily occurrence until about the time of neap tides, and shows the truth of Hardy's assertion, that "*there is no such thing as slack-water in the river Colorado.*" I took the whale boat on the afternoon of the 2nd and proceeded up the river with the flood-tide; rounding Howard point, (so called by Hardy) we found ourselves in a broad but shallow bay about 4 miles in width. At the north-east and north-west extremities we found the two branches of the river, the former of which he mistook for the Gila; this is in fact the main channel of the river, the other being merely a slough which divides the river, about a mile from its entrance, into two branches, one of which terminates in a small lagoon about 4 miles from its mouth, the other communicating with the river above. As there is not water enough in either of these branches to float a whale boat at low tide, it is evident that the river must have altered entirely since Lieutenant Hardy's visit, or that he never ascended it as he says he did

with the *Bruja*, a schooner of 25 tons. We sounded clear across the bay and found from $2\frac{1}{2}$ feet to $1\frac{1}{2}$ fathoms. As the schooner was drawing 8 feet, this settled the question as to her navigating the Colorado above this point."

After some interesting remarks upon the Indians who inhabit the country bordering on the river, Captain Wilcox continues: "The bar at the mouth of the Colorado is about 10, possibly 15 miles in width; the soundings upon it are from 10 feet to 4 fathoms; it is a very loose, muddy bottom, and with a stiff breeze a vessel could force her way over it, even if drawing a foot or more than the lead would indicate. The distance from the junction of the Gila and Colorado to the mouth of the latter, by water, is about 104 miles, owing to the many bends of the river, though the difference of latitude is but little more than half that distance.

The navigation of the gulf of California presents none of those difficulties which we had been led to anticipate. The wind we found invariably from the north-west, which, at this season of the year, is its prevailing direction; it is only during the months of June, July, and August that the gales from the south-east are prevalent; except in Whale channel we noticed none of the strong currents so frequently mentioned as existing in the Gulf.

It would be difficult to mistake the entrance to the Colorado, it being in fact the head of the Gulf, which gradually narrows from 40 to 8 miles when it is joined by the river, whose turbid stream discolours the Gulf for many miles to the southward, in soundings of 12 and 14 fathoms. On the Sonora coast, however, exists an indentation some 15 or 20 miles in depth, called by Hardy, Adair bay; the shoals of this can be seen from the mast-head, a view from which would prevent one falling into the error which he did of supposing it a mouth of the Colorado. The angle at the junction of the slough and the main river is called Arnold point, and from the mouth of the river (after crossing the bar) to this point, the channel varies in depth from 15 to 80 feet, at ordinary high tide, and may, as we have practically demonstrated, be ascended by a vessel having a draught of 8 or 9 feet, by taking advantage of the flood, which has a velocity of from 3 to 5 miles per hour. It is impossible to sail up, however, for although the river varies in width from 3 miles to 600 yards, the channel is narrow and the navigation elsewhere obstructed by the numerous sand bars. The proper method, after passing Gore and Montague islands through the western channel of the river, is that which we adopted, to drift with the flood tide, keeping close to the highest bank, sounding continually, and anchoring before the time of high water; in this way we progressed slowly but steadily, making, perhaps, 4 or 5 miles per day, until we arrived at the point where we finally landed the stores, and which I have named Invincible point.

Above Arnold point the river is very circuitous, the swell of the tide rapidly decreases, the channel becomes narrow, and the water has less depth. At this season, therefore, Arnold point may be considered the head of navigation for vessels of 9 feet draught; above this point we found always from 8 to 15 feet of water in the channel, whose width varied from 50 to 800 yards; and as the river at that time was at its lowest stage, I have no hesitation in saying that it may be navigated at any season of the year by a steam-boat of 18 or 20 feet beam, drawing $2\frac{1}{2}$ to 3 feet of water. A small stern-wheel boat, with a powerful engine and thick bottom, I would respectfully suggest to be a proper description of vessel for this navigation, where a strong current has to be contended with, and the channel, (somewhat

obstructed by small snags and sawyers,) is quite narrow in several places. At the present season (January, February, and March,) supplies from vessels arriving from the Gulf may be landed near Arnold point, upon the eastern bank, and a road being made from the post (a work of little difficulty over a level sandy plain) they might be transported by waggons across in three days. It would be preferable, however, to establish a depôt by anchoring a hulk near Charles point, laden with stores, from which a small steam-boat could carry more to the post in 24 hours than a hundred waggons could transport in a week. Either of these methods would be far preferable to the present slow, laborious and uncertain mode of supplying by waggons and pack mules across the desert from San Diego.

The time of high water at full and change at Arnold point is 8h. 20m. p.m., and the rise of ordinary spring tides about 12 feet; but during the season of freshets the river throughout its extent (judging from the statement of the Indians and the indications upon the banks) is at least 15 feet higher than at the time of our visit, and the velocity of the current which, above the effect of the tide, was from 1 to 3 miles an hour, is nearly doubled; the action of the tide ceases about 40 miles from the mouth; the banks of the river are low, flat, and either sandy or of crumbling clay which appears to have been deposited in successive strata. Near the mouth there is no vegetation, but higher up the shores are thickly lined with cane, rushes, small willows, acacia and cotton wood, and the country in the interior covered with a coarse sharp grass. Invincible point is in lat. $31^{\circ} 50' 28''$, long. $114^{\circ} 46' 48''$.

The large shoal south of the point is an island, except at spring tides, and is gradually increasing in size and height.*

CAPE SAN LUCAS is in about lat. $22^{\circ} 52'$, long. $109^{\circ} 58'$. It is of moderate height, and a few leagues northward of it the land rises so high as to be seen at the distance of 20 leagues. When in this neighbourhood, it is recommended to keep the lead constantly going, because the low shore is occasionally hidden by the haze which frequently prevails even when the weather is clear out at sea. At the distance of 27 miles from this coast, the depth is about 70 fathoms.

From cape San Lucas the coast trends westward about 8 miles to cape Falso, which is so named because at a distance it bears some resemblance to, and has consequently been frequently mistaken for, cape San Lucas.

Captain Wilcox, U.S. Navy 1850, rounded cape San Lucas at the distance of about 15 miles. When the cape bore N.E. by E. and cape Falso N. by W., the land appeared high, bold, and in the vicinity of the capes, mountainous. He remarked especially that the white chalky cliffs rendered the coast easy of recognition as they are visible at a considerable distance. The harbour he alludes to, we consider can scarcely be the well known bay of San Lucas on the east side of the cape, as that bay is sheltered from northerly winds and exposed to those from south-eastward, but must be on the north side of the

* San Francisco merchants are much interested to secure the trade of the Upper Colorado, which opens a navigable route to Colville, 420 miles from Salt Lake, and is fast acquiring commercial importance. Two different companies, each owning three steamers are engaged in a brisk business. Cargo for the Colorado river is delivered from San Francisco at fort Isabel, at the head of the Gulf of California, where it is taken up by the small steamers and carried to its different points of destination.

Between Colville and Salt Lake is a good wagon road, along which there are no less than forty-two thriving towns and villages. *New York Journal of Commerce*, April 24th, 1867.

cape; it is not mentioned on any charts of the coast we have met with. He says "We ran into the little harbour of cape San Lucas, anchoring in 16 fathoms water, within a cable's length of the shore. The harbour is but 2 miles in width, protected from the south-east by a high rocky bluff, but perfectly exposed to the north and west. It is an extremely dangerous anchorage, as a heavy surf is continually rolling in, and no bottom is found at 100 fathoms, till close into the beach."

SAN LUCAS BAY, on the east side of the cape, affords good anchorage, and shelter from north-westerly winds, but it is exposed to a dangerous and very heavy sea from S.W. by southward to East. The soundings are very irregular, and the anchorage, by reason of its great depth in the centre, is completely on a lee shore. At the village a small quantity of provisions may be obtained.

Captain Sir E. Belcher R.N., observes "they were nearly making a sad mistake, after shortening sail, by finding after they cast in 10, they had no bottom with 88 fathoms, just as they were about to let go the anchor. This shows the necessity of keeping the lead on the bottom before letting go an anchor.

This bay was first named *Aguada Segura* by the Spaniards, and afterwards altered by Vizcaino to that of San Barnabe, it being the festival of that saint when this navigator entered it, in 1602. It is the same bay in which Cavendish landed his prisoners, 190 in number, when he anchored there with his prize, the *Santa Ana*, taken from the king of Spain, in 1587. Some Americans and Californians now reside there, who supply the whalers which annually resort there with water, wood, cattle, vegetables, and fruit. The country is mountainous and sterile about the cape, and the supplies are brought from the valley of San José, about 20 miles to the northward, which is well cultivated. The water, which is procured from the wells, is sweet when drawn, and is very bright, but is impregnated with muriate of soda and nitre, which pervade the soil. It consequently soon putrifies on board."

It has been remarked in Captain Rogers's account of his voyage round the world, in 1710:—"This port is about a league eastward of a round, sandy, bald headland, which some take to be cape San Lucas, because it is the southernmost land. The entrance into the bay may be known by four high rocks, which appear like the Needles at the Isle of Wight, (England) when seen from westward. The two westernmost are in form of sugar-loaves, and the innermost of them has an arch, through which the sea makes its way. Leave the outermost rock about a cable's length on the port hand, and steer into the deepest part of the bay, being all bold, where vessels may anchor in from 10 to 25 fathoms depth. Here you may ride land-locked from all winds, save those between E. by N. and S.E. by S. Yet it would be but an ordinary road if the wind should come strong from the sea. The starboard side of the bay is the best anchoring ground, where vessels may ride on a bank that has from 10 to 15 fathoms depth. The rest of this bay is very deep; and near the rocks on the port side going in there is no ground. This is not a good recruiting place."

San Jose del Cabo Bay.—From cape San Lucas the coast trends north-eastward about 15 miles to an open bay, named San José del Cabo, where is anchorage in 25 to 20 fathoms at a short distance from the shore, opposite the little river San José. The village, called Salatea, is considered to be in lat. $28^{\circ} 8' 15''$, long. $109^{\circ} 87' 52''$. As this bay is exposed to all winds

between South by south-eastward to E.N.E., and the anchoring ground is very limited, it must be considered only a temporary stopping place.

Ceralbo Island.—From San José del Cabo bay to the great bay of La Paz, a distance, following the land, of about 100 miles, the coast trends northward and north-westward, and is quite unknown. As La Paz bay is approached, a large island named Ceralbo will come into view, the south end of which is estimated to be in lat. $24^{\circ} 9'$, long. $109^{\circ} 50'$, and the north end in lat. $24^{\circ} 22'$, long. $109^{\circ} 56'$. This island is sufficiently lofty to be visible from a considerable distance, and its western shore is reported to be bold and clifty;—as it has not been examined, it must be approached with considerable care. A rock 10 or 12 feet high, is inserted in the charts in lat. $24^{\circ} 80'$, long. $110^{\circ} 2'$, or at about 9 miles north-westward from the north end of Ceralbo, and about midway between is a rock under water named the Queen, and another upon which the sea always breaks; the positions of these rocks have not been absolutely determined, and there may be others in their vicinity.

ESPIRITO SANTO ISLAND.—In the direction of W. by N. $\frac{1}{2}$ N. from Ceralbo island, about 22 miles, is the island of Espirito Santo, situated in the entrance to the great bay of La Paz. Its south end is separated from the shore by a channel, said to be 8 miles wide, and having in nearly midway a reef under water; this channel is but little known and requires careful navigation. Northward of the island are other islets, divided from each other by narrow channels which are believed to be shallow and intricate.

At the south-west end of Espirito Santo island there is a little bay named San Gabriel, in which vessels may anchor in about 10 fathoms, and obtain shelter from northerly and easterly winds, but they must not go far in because the depth suddenly decreases to $8\frac{1}{2}$ and 2 fathoms, whence to the shore it is very shallow. In the middle of this shallow part there is a ledge of rocks, which extends out $\frac{1}{2}$ of a mile from the beach. The south end of the bay is in lat. $24^{\circ} 25'$, long. $110^{\circ} 19'$.

At about a mile northward of Gabriel bay, and on the same side (the west) of Espirito Santo island, is an anchorage in what is known as port Ballena. It consists of an open bay fronted by two small islets, named Gallo and Gallina, of which the first mentioned is the larger and most northward. The anchorage is at about midway between the islets in $5\frac{1}{2}$ to 6 fathoms, and shelter is afforded against easterly winds. Gallo island is considered to be in lat. $24^{\circ} 28'$, long. $110^{\circ} 21'$.

LA PAZ BAY.—From the island Espirito Santo, just mentioned, the bay of La Paz extends in a southerly direction about 20 miles. It is perhaps about 12 miles wide at the entrance, thence gradually decreasing in width as its head is approached, and is almost unknown, but is said to have a bold shore on each side, with a depth at a very moderate distance off of about 20 fathoms. As its shores have not been examined, it must be navigated with very great care. At about 5 miles within the bay on its east side is the harbour of Pichilingue; and further on, near its head, is the harbour of La Paz.*

* Lieutenant S. Osborn R.N. has observed that a vessel anxious to keep on the coast of Mexico, or its neighbourhood, during the bad season, cannot do better than run over to the bay of La Paz; he speaks of it as a splendid harbour.

Pichilingue Harbour is formed by the island of San Juan Nepomescino, which is about $1\frac{1}{2}$ miles in extent N. by W. and S. by E. and about $\frac{1}{2}$ of a mile broad. The island is distant from the shore only about $\frac{1}{2}$ of a mile, but in this space there is a depth of $4\frac{1}{2}$ to $6\frac{1}{2}$ fathoms on mud and sand; hence it forms an excellent harbour, where shelter may be obtained from almost all winds. The entrance is from southward, because the north end of the island is connected to the shore by a shallow flat of less than 10 feet at low water; in this entrance the depth gradually decreases from 10 to 6 fathoms. Old writers speak of the excellent pearl beds to be found in this harbour. The south end of San Juan Nepomescino is estimated to be in lat. $24^{\circ} 16' 5''$, long. $110^{\circ} 18' 15''$.

La Paz Harbour is formed by a projecting point of low marshy land from which a reef runs off in a northerly direction, and leaves between it and the eastern coast a narrow channel where small vessels may anchor. We possess no particulars of this harbour, further than that it can be used only by ships of very light draught which anchor within $\frac{1}{2}$ a mile of the village. At the village of La Paz supplies of various kinds may possibly be obtainable in small quantities.

SAN JOSEF ISLAND.—From Espirito Santo island to the south end of San Josef the bearing and distance are about N.W. by N. 20 miles. This island has an extent of about 18 miles in a direction parallel to the coast, nearly N.W., from which it is separated by a deep channel 4 miles wide. Some islets the largest of which is named San Francisco, lie off its south end, and it is here where the principal anchorage (in Amortajada bay) is to be found. Some small rocky islets also lie about 7 miles eastward from the island; they are known as the Animas rocks, are only about 80 feet high, and their estimated position is lat. $25^{\circ} 6'$, long. $110^{\circ} 27'$.

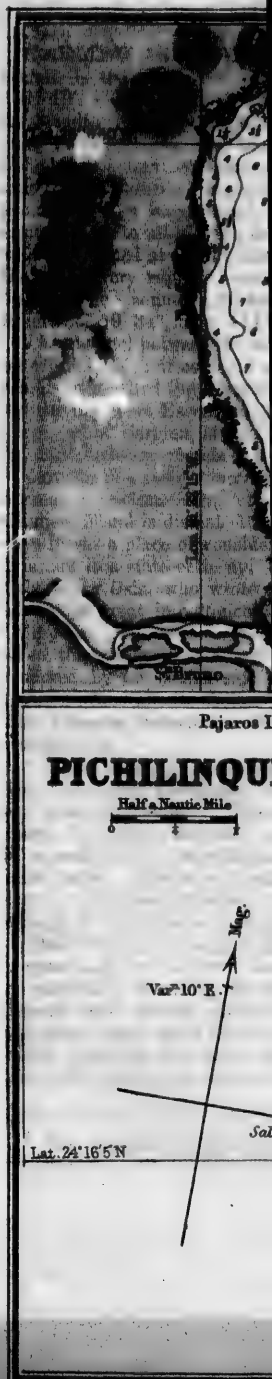
Amortajada bay is about 4 miles in extent in a W.N.W. and E.S.E. direction, and only about a mile deep. The soundings in it are 22 to 7 fathoms, and there is shelter from almost all winds. Fresh water may be obtained here. The position of the north end of the bay is considered to be lat. $24^{\circ} 54' 80''$, long. $110^{\circ} 85' 28''$. (See the Admiralty chart No. 2824).

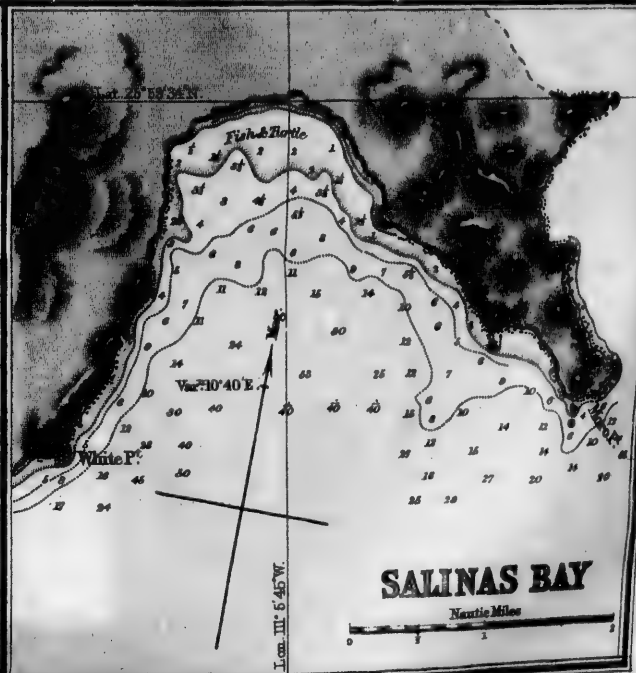
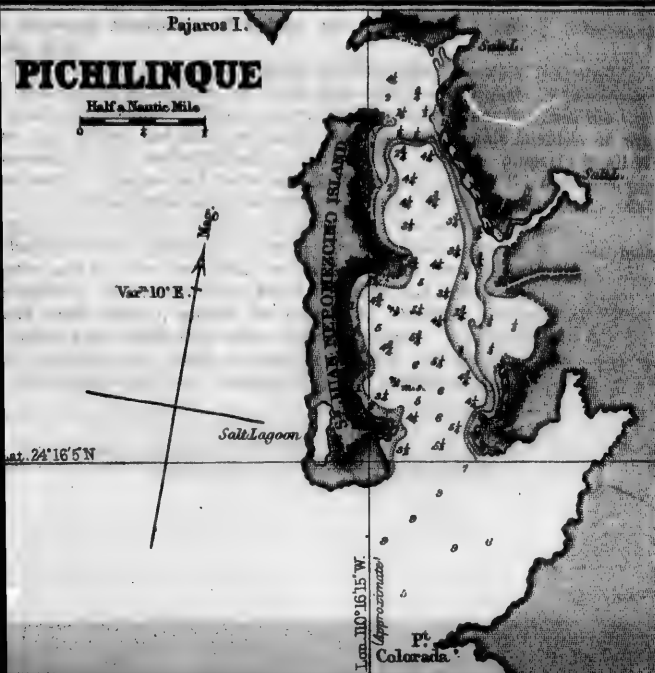
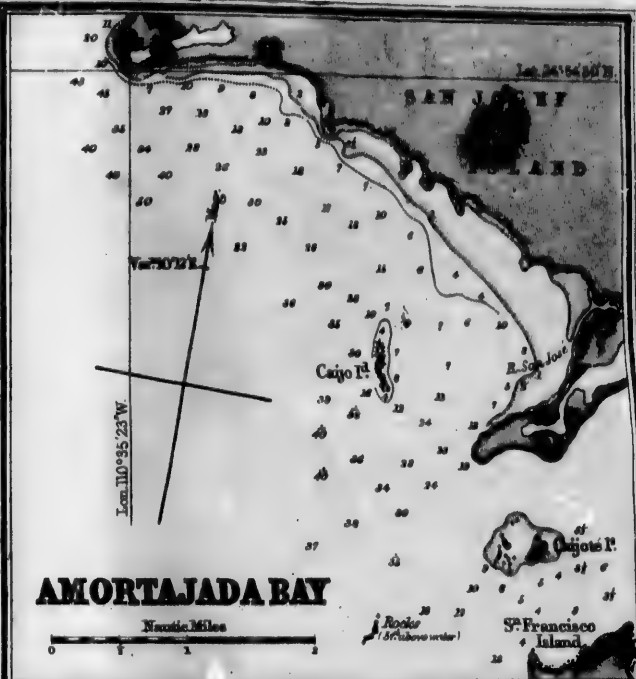
San Diego and Santa Cruz Islands.—At about 5 miles northward from San Josef island is a small rocky islet named San Diego, and northward of this at about the same distance is an island 8 or 4 miles in extent called Santa Cruz. The only landing place on Santa Cruz is at its south-west end; its eastern side consists of an inaccessible cliff.

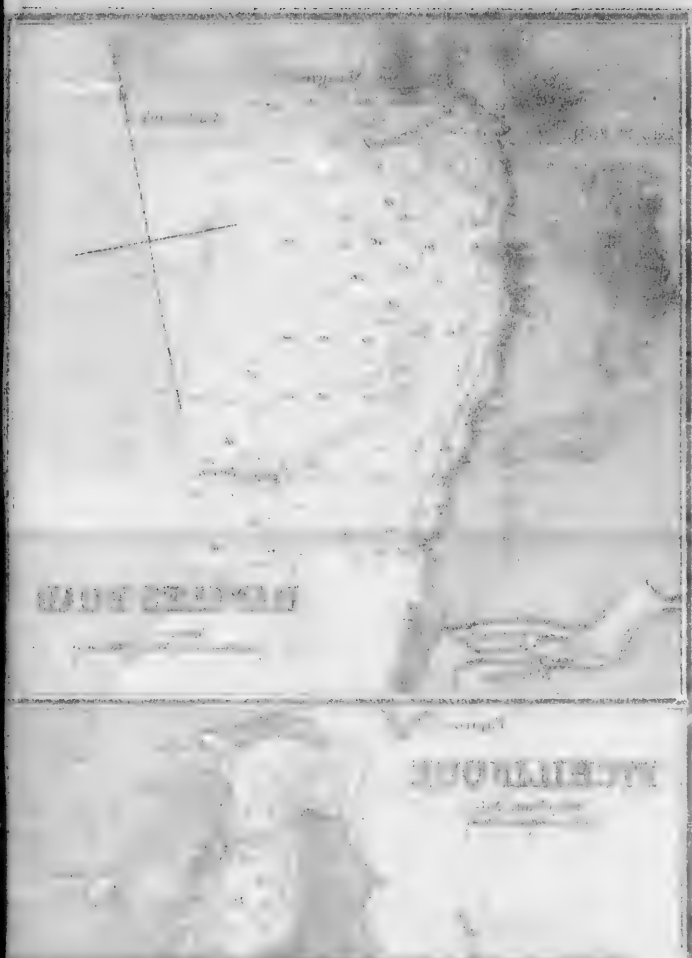
Catalina and Montserrat Islands.—Of these islands but little is known. The south end of Catalina is about 17 miles from Santa Cruz in a N.N.W. direction, and the island thence extends 7 miles almost due North (*true*), its north end being in about lat. $25^{\circ} 42'$, long. $110^{\circ} 47'$; it is reported to be a rocky cliff only 2 miles wide, having deep water at a very short distance from it.

Montserrat is nearly midway between Catalina and the coast, but nearer the latter; it has an extent of perhaps 8 miles, and its centre is considered to be in lat. $25^{\circ} 41'$, long. $111^{\circ} 8'$.

Some rocky islets named Galeras are inserted in the chart at nearly 2 miles northward from Montserrat; and a short distance northward of these is a dangerous rock nearly awash, as it is only 2 feet above the surface at high tide. The coast southward and westward from Montserrat is very imperfectly known, and is believed to be by no means free from detached sunken reefs.







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CARMEN ISLAND.—At nearly 10 miles north-westward from Montserraté is the south end of Carmen, situated in about lat. $25^{\circ} 49'$, long. $111^{\circ} 12'$. The island thence extends 16 miles in a northerly direction, and its breadth gradually increases until it becomes $8\frac{1}{2}$ miles at a short distance from its extremity. Its shores are steep, there being a depth of 7 to 10 fathoms at a very moderate offing, which increases to 40 fathoms at about a mile from the cliffs. On its east side there is a fine bay named Salinas, where protection may be obtained from northerly and westerly winds, but it is entirely open to all blowing from South to East; soundings of 6 to 10 fathoms will be obtained at a mile from its head, whence in the direction of seaward the depth very rapidly increases, there being at 2 miles from the shore no bottom when sounding 50 fathoms;—the head of the bay is considered to be in lat. $25^{\circ} 59' 84''$, long. $111^{\circ} 5' 45''$.

The channel between the south end of Carmen and the shore is believed to be 4 miles wide; it contains an island, known by the name of Danzanté, and a high rock called the Pinnacle, besides several rocks above and under water. A little bay, port Escondido, situated on the shore almost due West from the south end of Carmen, is said to have a depth of 5 fathoms and to be capable of accommodating vessels of a moderate draught of water in perfect security.

Loreto is a little village about 11 miles northward of port Escondido, its estimated position being lat. $26^{\circ} 1'$, long. $111^{\circ} 20'$; from it the north end of Carmen island is distant 10 or 12 miles in an E.N.E. direction. In former days it was a place of considerable trade, but this was many years ago, and it is now in a state of decay. It was founded in the year 1698, by Don Juan Caballero y Osis, who wrote a long account of it, and considered its locality as one of great importance, and subsequently it became the capital of Lower California. The anchorage is open to winds from North, N.E. and S.E., and when these prevail with any strength, so heavy a sea is sent in, that it is rendered by no means safe for a vessel not well found in ground tackle. Carmen island affords shelter from eastward, and the mainland from westward. The following description of Loreto was written in 1826 by Lieutenant Hardy, R.N.

"Loreto stands in a valley of about 2000 or 3000 feet wide, surrounded by wild and sterile mountains, of which that called La Giganta is the highest and least picturesque.* There are two gardens in the place in which the vine, peach, fig, quince, and date, are cultivated. A considerable quantity of wine is annually made, notwithstanding the fruit is common property to all the inhabitants. Peaches and pears are dried as well as figs; the dates are preserved; and these fruits are afterwards exchanged for wheat and Indian corn, brought to the mission in small schooners from the port of Guaymas.

The situation of Loreto is in a valley of very limited extent, in which there is space only for the town and two gardens; and there being in consequence no possibility of raising either wheat or maize, the inhabitants are obliged to depend upon Sonora, almost for existence. Another circumstance renders the tenure upon which they exist very precarious. I remarked that the hills which surround the town are chiefly composed of primitive rock, granite, and hard sand-stone, all intermingled, with scarcely any appearance of soil

* This mountain is estimated to be 4560 feet high. It is of volcanic origin, as is all the rest of the chain which runs through the Californian peninsula.

upon them. They are thus capable of absorbing but little moisture; and during the heavy rains, which happily do not occur more frequently than once in 5 or 6 years, the rush of water through every part of the town, as it comes down the ravine, is so great, that instances have been known of some of the houses having been actually carried away.

To prevent the recurrence of this danger, the former Franciscan friars, many years ago, erected a stone wall, to break the force of the water, and give it a new direction towards the sea. In successive years the rains washed this barrier away; and another was built, which by the returning floods was washed down also, and at present there is but a slight trace of its ever having existed. No attempts have been made to restore it; and on some future day it may be expected that the inhabitants will be seen floating down the Gulf! Although the natives are perfectly sensible of their perilous situation, the love of their dwellings is so great as to extinguish all fear for the future, and all desire to change their residence.

The inhabitants of Loreto are of a dingy, opaque, olive-green, which shows that there is no friendly mixture in the blood of the Spaniard and the Indian; or it may be, that by degrees they are returning to the colour of the aborigines. They appear to be the same squalid, flabby, mixed race, which is observed in almost every part of the Mexican coasts. I did not see a good-looking person among them, always excepting the commandant and *ci-devant* deputy!*

From Loreto to Mulege bay, a distance of about 65 miles, there are soundings near the land of 20 to 80 fathoms, and the coast offers several good anchorages. At 7 miles northward of Loreto is the little island of Coronados, under which there is shelter from north-eastward. Hence, following the coast northward, there are several small bays in which anchorage and protection from westerly winds may be obtained at a moderate distance from the shore.

MULEGE BAY.—The entrance to this extensive bay, situated in about lat. $26^{\circ} 58'$, long. $111^{\circ} 49'$, is only about 8 miles wide and faces the North. In front of it, in nearly mid-channel, are two rocks with deep water of 16 to 22 fathoms close to them; on account of which some care is required when running in. Thence the bay extends southward probably a distance of 15 miles, at the same time continuing to increase in breadth. In this latter part the depth varies considerably, less than 5 fathoms being found in some places and considerably more in others. Within it are numerous islands and small harbours, and it is said that there are also many shoals scattered over its surface, and that in no part is there good holding ground; yet that, a small vessel may be lashed alongside some of the islets with perfect safety. In the bay, there is asserted to be an excellent pearl-bed, but its existence wants confirmation.

On the western coast of the bay there is a well of fresh water, remarkable for the water rising and falling with the tide. It was examined by Lieutenant Hardy, in 1826, who ascertained that there was a communication between the

* The Placeres de Perla, or Pearl beds, in the neighbourhood of Loreto, are the following:—the south-west point of Carmen island, port Ballandra (north-west side of Carmen island), port Escondido, Arroyo Hondo, Coronados island, Tierra Firme, San Bruno, La Piedra Negada, and San Marcos island. The four first are situated south, and the latter five northward of Loreto, at which place, says Lieutenant Hardy, in 1826, the Virgin and the custom-house receive their proportion of the pearl fishery, which for the last 80 years has not exceeded, as I am informed, the value of 70 dollars annually.

mountain and the well, which is merely a hole of 12 inches (?) diameter, and of the same depth, situated close to high water mark. It is naturally formed, and is a great accommodation to travellers, being the only fresh water between the missions of Loreto and Mulege; so that it serves as a sort of half-way-house. Its rise and fall depend on the elevation of the sea, which, when it ebbs, allows the fresh water (which is of excellent quality) to filter through the porous sand-stone in which the well is formed.

A little to the north-westward of Mulege bay, is the mission of Santa Rosalia de Mulege, which can only be discerned from the sea by a small hill on the coast named Sombrerito, from its resemblance to a hat. The entrance to the harbour is very shallow, and will only admit very small vessels. The coast is whitened with surf, and the shallow water extends about 2 miles from the shore. Lieutenant Hardy R.N., 1826, says that "being abreast of Sombrerito, with the wind easterly, we bore up, and stood directly for the coast, with our head about a quarter of a point to the southward of that hill, in order to avoid a reef of rocks that runs off from it for some distance. When within 150 yards of the shore, Sombrerito then bearing off us N.N.W., and being in-shore of the reef, we hauled up, and stood for the centre of the hill, till within 35 yards of it, when we dropped our anchor, and ran out warps to the shore on both sides of us, to prevent the vessel from either drifting or swinging, for which there is no room.

The water on the bar is so shallow, that we touched twice in going over it; but as it was composed of only soft sand, the vessel received no injury, although it blew fresh from the eastward, with a heavy swell on the shore. In the situation where we ultimately moored, there are 3 fathoms close by the hill, and it is well sheltered from wind and sea.

There is a small rivulet here, extending above the mission, which is at the distance of 2 leagues from the coast. From the sea, the hill of Sombrerito hides all appearance of the ravine; but from the shore, the date, olive, and peach-trees, as well as plantations of vines and maize, present a cheerful show of verdure by no means common in Lower California. About the distance of a league from the mouth of the rivulet, the water is fresh, and I took advantage of it to re-fill our empty casks.*

This mission of Santa Rosalia de Mulege was established in the year 1700 by the Marquis de Villa Puente, as it is supposed, and its distance from

* It appears from the following that Lieut. Hardy experienced some difficulty in leaving the harbour of the mission of Mulege "Not having been successful in my search for divers, I determined to proceed to sea. The wind was still dead upon the shore; and as it was not possible to attempt taking the vessel out through the channel, without her being inevitably driven on to the beach, I sent the boat ahead with a rope, and we succeeded in towing the *Briga* through the midst of the rocks, which were perfectly distinguishable at intervals by the heave and fall of the waves, which enabled us to avoid them. Having got fairly outside of them, we clapped on sail, shaped our course along shore, and in two hours time went through the passage formed on the left by the low point of Santa Inez, and on the right by the island named after the same saint, carrying 4 and 5 fathoms water. Having doubled the point, we came to anchor on the south-west side of the island of San Marcos, round which I had been given to understand pearls had been formerly fished. We found, however, only a few unproductive shells. On this island there are numbers of wild goats, and I sent the captain and a part of the crew to hunt them."

This part of the gulf of California is so rarely visited that it is but little known;—there has not been even a running survey of the coast. Northward of San Marcos island the Gulf is quite unknown, and its delineation on the chart has no pretensions to accuracy.

Loreto is about 45 leagues. It produces wine, spirits, and soap, which are exported chiefly from the capital; besides grapes, dates, figs, and olives, all of good quality. These form the principal branches of its commerce.

About 6 or 8 leagues from Mulege, at some distance from the shore side, is the mission of La Madalena, established about the same period as the former; but by whom is not known. Its productions are the same as those of the Mulege; but the quality of the spirits which are made from the mezcal, growing wild about the mountains in its neighbourhood, is said to be the best of any made in Lower California. Its population is about equal to that of Loreto.

From Mulege bay the coast trends northward 10 or 12 miles to cape Barracas, off which at a short distance in a south-easterly direction is a cluster of small islets named Santa Inez; these have several sunken rocks about them. Vessels may occasionally anchor under cape Barracas in 10 to 4½ fathoms, and obtain shelter from north-westerly and westerly winds.

San Marcos Island.—From cape Barracas following the coast in a north-westerly direction about 7 miles, we come to the island of San Marcos, the centre of which is in about lat. $27^{\circ} 12'$, long. $111^{\circ} 57'$. This island is 5 miles long N.N.W. and S.S.E., and 2 miles broad. The channel between it and the shore is 3 miles wide and has a depth of 4 to 7 fathoms. A reef, with some rocks named Lobos, extends from the south end of the island, nearly half over to the coast. It is stated that from this island may be obtained abundance of talc, soft marble, and pumice-stone of excellent quality. There are two kinds of the latter, white and yellow; but only the former is good. One of the hills is almost entirely composed of talc. At the northern extremity of the island there is good fresh water.

In the vicinity of San Marcos island is a pearl fishery which in former times was fished with considerable success. Opposite the island, or in the vicinity of cape San Marcos, (which cape is in latitude about $27^{\circ} 26'$), and at the distance of two leagues from the coast, are what remains of the mission of San Ignacio, established in the year 1725. At 30 or 40 miles north-westward of this mission there is said to be an exhausted volcano, on one of the hills named Las Tres Virgines, from which sulphur may be obtained.

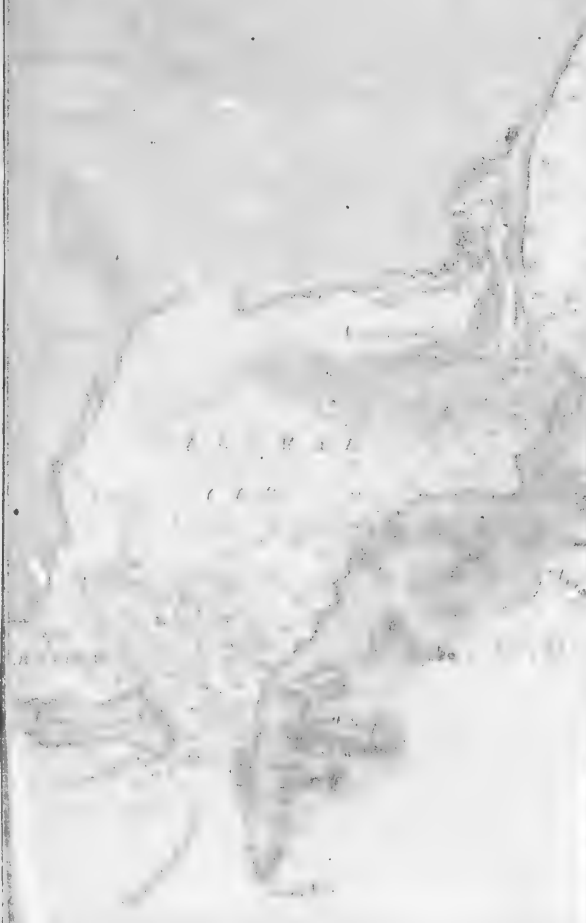
The coast of the main land, northward of San Marcos island, is stated to be iron-bound, and it is also asserted to afford no shelter whatever. At about 40 miles from Mulege mission, is a small bay, named Thomson, in which vessels may occasionally anchor, but it is open to every wind except those from south-eastward.

A little northward of Thomson bay are some islands named *Sal si Pudes (Get back if you can)*, in the vicinity of which the current runs strongly, sometimes south-eastward, and occasionally in the opposite direction. The larger island is about 7 miles in circumference, and very mountainous. The hills are chiefly composed of a red stone, which has very much the appearance of cinnabar. Near these islands are others, named Las Animas and San Lorenzo, by which a very dangerous passage is formed.

In about lat. 29° the long and narrow island of Del Angel de la Guardia, forms in conjunction with the western coast, a channel in which numbers of whales have been seen, hence this passage is named the Canal de Ballenas. Opposite the island, and 9 leagues inland, is the mission of San Francisco de Borja.

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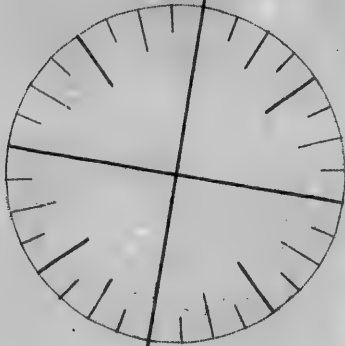
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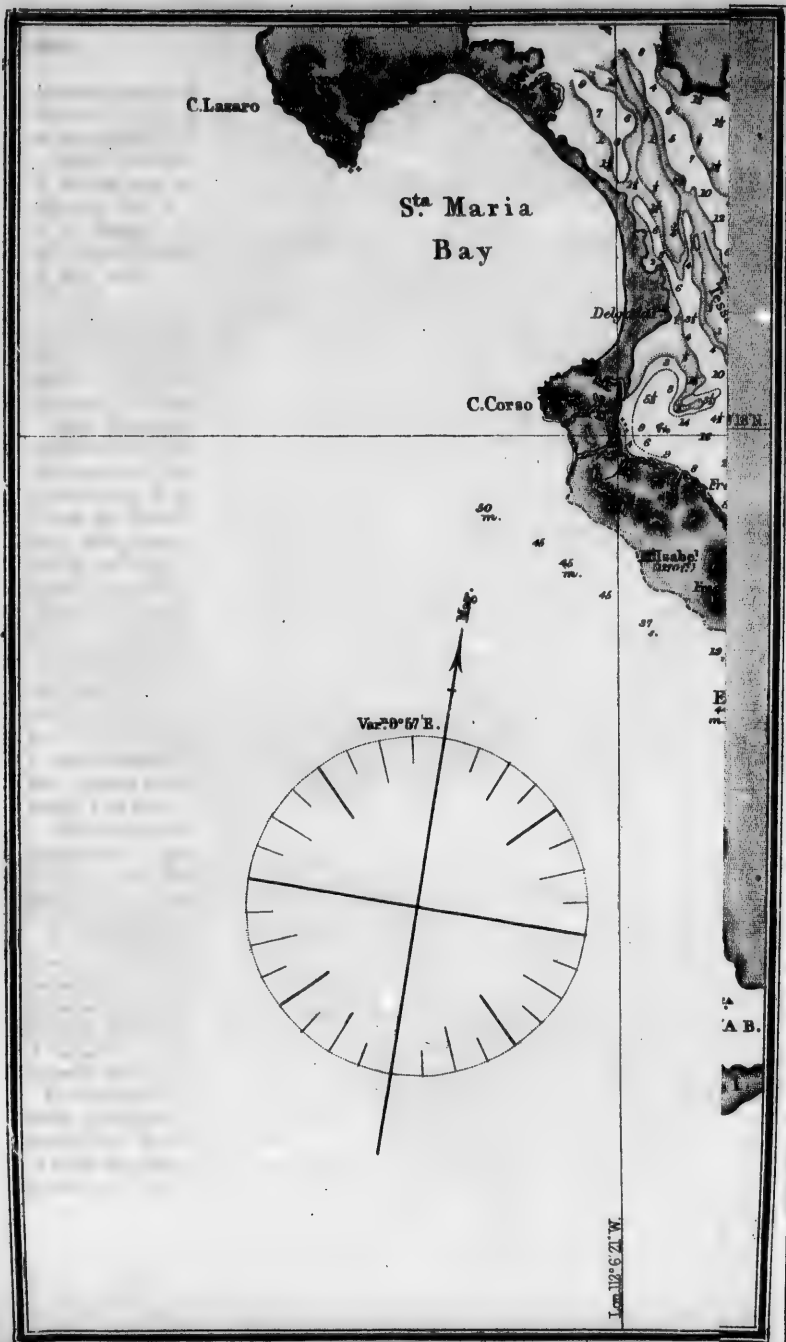
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MAGDALENA BAY

Nautic Miles





CAPE SAN LUCAS TO POINT CONCEPCIÓN.

The Coast.—Cape San Lucas has been already mentioned in page 117. From it the coast trends in a north-westerly direction about 140 miles to the island Santa Margarita, bay of Magdalena, and is quite unknown. The navigator Colnett speaks of it in the following terms in 1794, "Our cruising ground was between latitudes 23° and 25° , and longitudes 112° and 118° , off a remarkable mountain near cape San Lazaro, to which I have given the same name,—I make it to be in lat. $25^{\circ} 15'$, long. $111^{\circ} 20'$. Southward of it is very low land, till within a very few leagues of cape San Lucas, which is the south point of California, when the land rises to such an eminence, as to be seen at the distance of 20 leagues, but the cape itself is of very moderate height. Though the weather was fair and pleasant, it was so hazy while we were on this *low and dangerous* coast, as to require a continual employment of the lead. We frequently got soundings with 70 fathoms of line at the distance of 9 leagues from the shore. I made the cape by means of a number of observations of sun, moon, and stars, to be in lat. $22^{\circ} 45'$, long. 110° ."

MAGDALENA BAY.—This extensive inlet lies between longitudes $111^{\circ} 30'$ and $112^{\circ} 15'$. It is protected from the sea in a south-westerly direction by the large island of Santa Margarita, and has soundings over nearly the whole of its extent of 20 to 10 and 4 fathoms. Its principal entrance is at the west end of this island, through a channel 8 miles broad, and here the width of the bay (from the entrance to the main land opposite it) is about 12 miles; consequently there is ample room for the accommodation of almost any number of vessels. Santa Margarita is a lofty island, one of its hills near the east end being probably not less than 2000 feet high; the narrow neck of land on the west side of the channel also rises to a considerable height, mount Isabel having an elevation of 1270 feet. Cape San Lazaro, which may be considered the north-western boundary of the bay, is 1800 feet high.

Magdalena bay was surveyed in 1887 by Captain Du Petit Thouars of the French Navy, and in 1839 by Captain Sir Edward Belcher, R.N. To the chart of the latter officer, published by the Admiralty (No. 1980), we must refer our readers, as a written description of the bay will necessarily convey a very inadequate idea of the advantages it possesses.

The entrance, as already stated, is about 8 miles wide; rocks line the shore on both sides, so that it is recommended to keep as near the middle as possible, where will be found from 12 to 18 fathoms, rocky bottom, with shells. When within, there is a similar depth on sand and shells. At the head of the bay in its north-west corner, are numerous sand-banks having between them a channel 5 fathoms deep, which runs up the coast past cape San Lazaro as far north as lat. $25^{\circ} 30'$ or even further; northward of the cape this channel is divided from the sea by a very narrow belt of low land covered with sand hills. The land forming the north side of the bay is so little above the sea level that when off the north-west end of Santa Margarita island it cannot be seen from the deck.

Captain Du Petit Thouars says:—"The high land of cape San Lazaro affords an excellent mark for making the land, as it can be seen at the distance of 10 or 12 leagues. The entrance of the bay is 8 miles wide and very brief. It presents no difficulty, if only care be taken not to go too near the south point, because of a detached rock, on which the sea breaks, situated about $\frac{1}{2}$ a mile from the point. In tacking, when within the bay, care must be taken to avoid the Venus bank; it is necessary also to keep sufficiently far from the low land to the East and N.E.

Anchorage can be obtained in the north-west part of the bay, or in the south part of it, according to the prevailing winds. The holding-ground is moderately good.

The bay offers no resources, as there are neither houses, wood, nor water.

Outside the bay, the current runs southward, with a strength of about $\frac{1}{2}$ of a mile per hour.

The tides are regular, and occasion very strong currents at the entrance of the bay. It is high water, on the days of full and change of the moon, at 7h. 37m. The tide rises about 6 $\frac{1}{2}$ feet.

Sir Edward Belcher, R.N., observes, "I was fully prepared to have found, as the name imported, an extensive bay; but on entering the heads, which are about 2 miles asunder, no land could be discerned from the deck, from N.W. to N.E. or East; and even after entering, it was quite a problem in this new sea where to seek for anchorage, our depths at first, even near the shore, ranged from 17 to 80 fathoms. However, as the prevailing winds appeared to be westerly, I determined on beating to windward, in which it eventually proved I was correct. About 4h. P.M., we reached a very convenient berth in 10 fathoms, with a very sheltered position for our observatory. Preparations were immediately made for the examination of this extensive sea, or what I shall in future term the gulf of Magdalena.

It is probable that this part of the coast formerly presented three detached islands; viz., San Lazaro range, Magdalena range, and Margarita range, with one unnamed sand island, and numerous sand islets. It is not improbable that its estuaries meet those from La Paz, forming this portion of southern California, into an immense archipelago.

The first part of our expedition led us up the northern branch of what held out some prospect of a fresh water river, particularly as frequent marks of cattle were noticed. In the prosecution of this part of our survey we noticed that the San Lazaro range is only connected by a very narrow belt of sand between the two bays, and that the summits of some sand-hills were covered, in a most extraordinary manner, by piles of fragile shells, which resembled those found recently in the gulf. At elevations of 50 and 60 feet, these minute and fragile shells were found *perfect*; but on the beaches, either seaward or within, not a shell was visible. This is the more extraordinary, as these sand wastes are constantly in motion, and drowning everything else, and yet these shells are always exposed! On digging beneath them to erect marks, no beds of shells occurred, nothing but plain sand. It was further remarkable that they appeared to be collected in families, principally arca, venus, cardium, and murex. When ostrea appeared, they were by themselves.

The cliffs throughout the Gulf abound in organic remains, and I cannot but believe that the same cause has produced the above unaccountable phenomena, which I witnessed throughout a range of at least 30 miles.

Having explored the westernmost estuary, about 17 miles northward of our observatory, until no end appeared to its intricacies, I resolved on attempting a second, which afforded a wider entrance, and offered deeper water. This was examined about 4 miles beyond the last, and it still offered ample scope for employment, the advance boat being at that moment in 4 fathoms, and distant heads in view; but considering that sufficient had been done to show that no hope offered of reaching fresh water, and that the still unexplored state of the gulf would engross all our spare time, I determined on adhering to its main outlines, which eventually offered so many intricacies as almost to baffle our patience.

One circumstance connected with the examination of the second estuary afforded very strong proof that no fresh-water streams were in the vicinity. It was the fact of finding near our advanced position many large specimens of the asteria medusa, or euryale, an asteria seldom found but in pure, and generally deep salt water. At least twenty were taken by the dredge.

By the 9th of November we had reached the eastern end of the first gulf, when the ship was moved into the second, the channel or strait connecting them being not more than a $\frac{1}{2}$ of a mile wide. I had been very sanguine in my expectations that we should have discovered a safe channel out by the eastern end of the island of Margarita; but until satisfied upon that point I took the *Starling* and boats to explore. I found that our boats, and, upon emergency, the *Starling*, might have passed out, but it was far too doubtful and intricate for the ship.

During the time the boats were thus engaged, I overlooked them from the summit of one of the highest peaks of Margarita, and plainly saw the outlines of the shoals, and the difficulty of the navigation, even for boats. I had also a fine view of the southern unnamed island, which terminated in a crescent about 10 miles to the S.E., with a passage very similar to that immediately beneath.

We had frequently seen indistinctly the outlines of very high mountains to the eastward, distant about 50 or 60 miles. But on this day I could detect abrupt breaks, which indicated water-courses between them, and could plainly follow out the yellow breaks of cliffs, as far as the eye could trace inland.

I have not the slightest doubt that these estuaries flow past them, and probably to the very base of the most distant mountains, even into the Gulf of California. As I am informed that there are no fresh streams in the district of La Paz, and that several esteros ran westerly from that neighbourhood, it is not improbable that they meet. Although the solution of this question may not be commercially important, it is one highly interesting in a geographical point of view.

After all the time expended, independent of severe labour, on this immense sheet of water, it will naturally be enquired, what advantages does the port offer? The reply is: at the present moment, shelter; and from several water-courses nearly dry at the time of our visit, it is evident that very powerful streams scour the valleys in the winter season, which in this region is reckoned between May and October.

Fuel (mangrove) can be easily obtained in the esteros.

As a port for refit after any disaster, it is also very convenient; and for this purpose, either our northern or southern observatory bays may be selected. The latter would afford better shelter, but the former is certainly more con-

venient, and less liable to difficulty of navigation, the access to it being entirely free from shoals.

In war it would be a most eligible rendezvous, particularly if watching the coasts of Mexico or California, as no one could prevent the formation of an establishment, without adequate naval force; and the nature of the country itself would not maintain an opposing party.

The island of Margarita would afford an excellent site for a deposit for naval stores. Martello towers on the heads of entrance would completely command it, and, excepting on the inside, no force could be landed.

Water would doubtless flow into wells, of which we had proof in spots where the wild beasts had scraped holes; but from some (no doubt removeable) causes, it was intensely bitter. There is nothing in the geological constitution of the hills to render it so.

The ranges of hills composing the three suites of mountains, vary from 1500 to 2000 feet, and are composed principally of fragments of horriblende slate, serpentine, sandstone, and primitive limestone."

The Coast.—From the entrance of Magdalena bay to cape Corso, the north end of the narrow but elevated neck of land separating the bay from the ocean, the distance is about 9 miles; the coast then falls low, and bends inwards 4 or 5 miles from the general direction of the land, and forms with cape San Lazaro the bay of Santa Maria, which is entirely open to westward.

Cape San Lazaro is considered to be in lat. $24^{\circ} 48' 20''$, long. $112^{\circ} 18' 28''$. Its height (1800 feet) renders it visible at a considerable distance, and it is a prominent object when viewed directly from westward. The country behind it, and immediately southward and northward of it, is very low. Viewed from an offing of some miles the cape appears as an island.

From cape San Lazaro the coast trends north-westward about 140 miles to point Abrejos, a low projecting headland the position of which is considered to be lat. $26^{\circ} 48'$, long. $118^{\circ} 36'$. From this point a reef of rocks extends out a considerable distance (6 miles, it is said), hence the name Abrejos (*open your eyes*) is suitable enough. Between the point and the reef is a channel, which is reported to be deep enough for ordinary vessels, but as it has not been examined it should be used only in an emergency.

Ballenas Bay.—Abrejos point is the western extremity of a large open bay, named Ballenas, on account of its being a favourite resort of the hump-back species of whale. A small estero lies immediately north of the point, and there is another 15 miles eastward of it. The soundings in the bay are reported to be regular and to extend a considerable distance from shore; at less than a mile from the beach the depth is asserted to be 8 fathoms, whence they increase gradually seaward. The bay affords no shelter, as it quite exposed to southward and south-westward, from which quarters a heavy sea is sent in when the wind blows with any force.

In the eastern part of Ballenas bay, in about lat. $26^{\circ} 45'$, is the entrance to a very extensive lagoon, which is probably deep enough to admit vessels drawing not more than 12 feet. The principal branch of this lagoon is about 2 miles wide at its mouth; after running northward for 8 miles, it turns a little to westward and doubles its width at 6 miles from the bar, then gradually contracting it ends at 8 miles further up, making the whole length 14 miles. A small branch, making from the south part of the entrance and taking a more easterly course, runs through a low flat country 12 to 15 miles when it reaches a high table land. Another small estero, 15 miles further south,

emptying into the sea, joins the southern branch of the main lagoon.

Near the head of this sheet of water are two islands, not more than 4 miles in length and 1 in width; both are very low. The upper island, on its highest part, has a growth of trees and low bushes, which gives it a pleasant contrast with the surrounding country. The southern island is quite barren. The face of the country, immediately in the vicinity of this inland water, on either hand, is low, quite level, and extremely barren; a few stunted shrubs and mesquit trees are now and then met with, and a species of rush grass is found in many places, but so scattered, that no appearance of anything but a sandy desert plain is seen a short distance from the shore. To the south-eastward rises a long table-land, to the height of 1000 feet or more, and then comes a wild mountainous country as far as the eye can see. To the north-east there is a belt of level land, that appears to extend through the peninsula to the gulf of California. To the north-west is another low tract of barren waste, which runs between high broken land.

It is stated there is trail leading from this lagoon to another, called Ojo de Lievre, the distance being 70 miles. The native name of this lagoon is Susa Maria. In a northerly direction from its head, distant 85 miles, rises a mountain, showing three swells of land at its summit; it is called San Ignacio, and at its foot is a mission bearing the same name. As this mountain is viewed from the coast, a still higher elevation is seen, standing alone, with rounded peak. At its base are hot sulphur springs.

The entrance to this fine body of water is shoal, narrow, and extremely dangerous, on account of the strong currents running in different directions at different stages of the tide. A depth of 7 feet of water only is found at low tide; the rise and fall is about 6 feet. A heavy swell usually rolls on the bar at full and change of the moon, and it is only practicable for small vessels of light draught.*

Asuncion Island.—From Abrejos point the distance to Asuncion island situated in about lat. $27^{\circ} 8'$, long. $114^{\circ} 24'$, is nearly 50 miles in a north-westerly direction. The coast between is low near the shore; the beach fronting it, being composed of white sand, is seen at a considerable distance in the offing when it contrasts strongly with the brown clay cliffs and banks.

San Roque Island.—From Asuncion to San Roque island the distance is about 8 miles in a northerly direction. This island is of but small extent, and not so lofty as Asuncion. It is reported to be covered with an inferior kind of guano.

SAN BARTOLOME.—From San Roque island a high bold coast continues nearly 80 miles to the harbour of San Bartolomé, the north-west point of which (Kelp point) is in lat. $27^{\circ} 39' 58''$, long. $114^{\circ} 54' 10''$, according to the observations of Captain Kellett, R.N. This bay is only 8 miles in extent, with soundings over the surface of 8 fathoms, gradually decreasing to 4 and 3 fathoms at its head. The north-western point has some rocks off it; immediately round it to the northward is the landing-place. The eastern point of the bay, cape Tortolo, has a reef of rocks, mostly above the water, extending from it nearly half-way across the bay, the outermost rock of which,

* See the *Mercantile Marine Magazine*, Vol. for 1860, from which the description of this lagoon is chiefly taken. All the coast between Magdalena bay and San Diego, in lat. $32^{\circ} 41'$, is very little known, and is believed to be very imperfectly delineated in the charts.

the Sulphur, is 30 feet high; this reef affords good shelter to vessels lying within it.

The land round port San Bartolomé is high, and the soundings immediately outside it are deep, there being from 20 to 30 fathoms at 2 miles off. Capt. Sir E. Belcher, R.N., says, "the surrounding land is high and mountainous, composed, as far as we had opportunity of examining, of every rock occurring in trap formations, but reduced to fragments not exceeding four or five pounds weight. Marine shells, similar to those found on the shores of the bay, were plentifully mixed up with this general debris, and in the layers between some clay beds, crystallized gypsum abounded.

The bay is formed by a high range of loose cliffs on the north, and fine gravelly bay on the east, and a coarse sandy tongue connects a high peninsula or island at high water in its centre, (forming a third southern bay). From this peninsula rocks extend northerly, partly under water, jutting into the heart of the bay, and forming a safe land-locked position, having 5 fathoms within.

The place of observation on the northern head of the bay is situated in lat. $27^{\circ} 40'$, long. $114^{\circ} 51' 20''$. The anchorage we took up was in 7 fathoms, sheltered from all but S.W. winds, but bad holding-ground."

Another writer says—"in the southern part of the bay of San Bartolomé there is a fine anchorage sheltered from all winds. The harbour is much frequented by the whalers, who resort thither to *cooper their oil*,—or to pass a few days in fishing or catching turtle. It is usually called 'Turtle bay,' by them. Wood may be procured here, in case of extreme necessity, by searching for low green bushes in the level land about the shores; the roots are found running near the top of the ground and are 8 or 10 feet long and often 6 inches through; they burn readily, and produce the required heat.

At the time sailing vessels were plying between Panama and San Francisco, occasionally some of the number, in actual distress for many of the necessary articles of provisions, put into port San Bartolomé, hoping to have their wants, to some extent, relieved. One vessel is said to have anchored here with nearly all her crew down with the scurvy, and several of them died. Numbers of hapless adventurers have found a final resting-place along the shore of the inner bay, and on an islet that breaks the ocean swell in front of the harbour. Here are found grave-boards, some rudely carved, giving the date of interment; other graves are only marked by rough stones, and countless numbers of sea-birds nightly cover the ground above them." *Mercantile Marine Magazine*, Vol. for 1860.

The Coast.—From the bay of San Bartolomé the coast trends 17 miles in a north-west direction to point San Eugenio, the extreme western point of which, Morro Hermoso, is in lat. $27^{\circ} 52'$, long. $115^{\circ} 7'$. Off this point, to the north-westward, is the large island of Cerros, and nearly midway between is another of smaller size named Natividad. At this headland the coast suddenly turns eastward, and after continuing in that direction many miles, gradually turns northward and north-westward and forms with Cerros island the great bay of San Sebastian Viscaino. All this part of the shore of California is almost entirely unknown, but it is stated to contain several bays in which no doubt anchorage may be obtained. The only description we have of it is the following extract from the *Nautical Magazine*, 1860; the island spoken of, San Geronimo, is in about lat. $29^{\circ} 40'$, long. $115^{\circ} 44'$.

"The coast of Lower California, from San Geronimo island to the great

lagoon, trends S.E., presenting a nearly unbroken range of rugged mountains, scantily clothed with cedar trees, but in many places barren of all verdure; and, to judge by the appearance from seaward, unfit for human habitation. For about 80 miles the sierra closes on the sea, throwing out bold rocky promontories, offering no shelter for vessels, although promising deep water close in shore. Here and there long stretches of white sandy beach appear, on which the surf rolls heavily. Following the coast down to where Cerros island bears about S.W., a headland will be observed in the main land, known by the name of Lagoon head, from rising abruptly out of a low country which is passed after leaving the mountain ridges already mentioned. This headland is high and black like a hummock, but appears to have no other elevations inland from it.

Immediately southward of this is a lagoon about 10 miles long by 7 broad, to which no name has yet been given. It was entered by whale-boats, and partially explored; but there is not depth enough for a ship to pass over the bar, on which a heavy surf breaks in westerly winds. The land subsides again into a low marshy country from Lagoon head for about 12 miles, when, in following the coast to the S.E., the mouth of a second and larger lagoon is opened. This is about 15 miles long by 8 wide, and has depth of water sufficient to float a ship; but the bar is very dangerous. It is known as the San Domingo lagoon. Navigators will be very apt to mistake this or the first one for the big or whaling lagoon (that named Ojo de Lievre); but care should be taken to pass by two entrances before standing in for the land. The whaler *Black Warrior* was lost at the mouth of this second lagoon, while attempting to enter, having mistaken it for the large one, which is still farther southward. On leaving Lagoon head, a ship may stand along at a distance of 6 miles from the beach, keeping in about 7 fathoms of water.

After passing the second lagoon, about 10 miles from the head, the outer breakers at the entrance of the big lagoon may be plainly seen, as well as those on the bar, stretching 4 or 5 miles seaward; keeping inside of these the inner breakers will appear in shore, and the channel lies midway between the two lines. This channel may be plainly seen, it opens gradually, shoaling until on the bar, which has 2 fathoms at low water and 8 at high water spring tides, and is from $\frac{1}{2}$ a mile to 1 mile wide. The bar is about $\frac{1}{2}$ of a mile across, and when passed, the water rapidly deepens to 4, 5, and 6 fathoms. The entrance is then plainly visible, formed by two *sau* heads, about 30 feet in height. The deepest water is midway between the heads, after passing which the right hand shore should be kept aboard, and with the lead going there will be no difficulty in running into the lagoon.*

This lagoon (Ojo de Lievre) was first entered by Captain Scammon in the spring of 1856. While whaling in Magdalena bay, a Mexican informed him of it, but never having been there, he was unable to describe its situation, although he judged from the low character of the country and the receding of the mountains in that direction, that the lagoon must be there. He accordingly set out on an exploring expedition, and first struck the small or northern one, which with the next, he partially explored, and was three days

* See the remarks upon the lagoons in page 128. The lagoons appear to be identical but the geographical descriptions differ. In the imperfect state of the charts of this coast at present existing, it is impossible to reconcile these differences.

getting down to the big one, the approach to which looked very dangerous to a stranger. Having sounded the channel with his boats, he took his ship in. The explorations which have thus far been made lead to the supposition that these three lagoons were, at one time, a single body of water, and it is thought that, owing to the marshy character of the country, there may still be, during the rainy season, communication by sloughs or branches; but this is not known. The mountains, with their serrated peaks, traversing the Lower California peninsula, generally close with the coast, either within a few miles of the beach, or from jutting headlands washed by the waves of the ocean. The chain opposite to where the lagoon is, turns inland about 20 miles, opening a sort of amphitheatre, forming the bed of the lake, which is filled from the ocean, and the only inlet or outlet to which, thus far discovered, is the entrance already described. A small space of rising land intervenes between the western border and the foothills of the mountains, which are wooded in a few places, but appear generally to be sterile and valueless.

Around the borders of the lagoon are ranges of sand hills, extending in every direction, being apparently the collection of ages, drifted in from the ocean. This feature gives to the vicinity an aspect somewhat similar to that of the ocean beach opposite San Francisco, but without the rocks and headlands. These sands are ever moving and changing, in consequence of being thus driven by the fierce ocean winds. A boat which was left for a few days near the southern border of the lagoon was completely filled with sand, and would, in another week, have been entirely hidden from sight by it. Of course no trees nor herbage of any kind exists there, nor can any kind of cultivation be carried on. Changes in the face of the country are going on constantly. Logs of redwood, 8 or 4 feet in diameter, are even found half covered over by sand, and sometimes several miles from the water. These are evidently of Oregon growth, and have either been thrown into their present position by the surf, in some tremendous storm, or being once lodged on the beach, the sands have encroached on the water, leaving the logs far inland in the course of time. Their presence is accounted for by currents setting down from the northward. Fresh water and wood are very scarce, and should an unhappy wayfarer chance to get lost in these trackless wilds, starvation would be inevitable. Several instances of this are very well known.

The lagoon from its entrance expands at once into a vast sheet of water. In every direction nothing is to be seen on the shore but scrub bushes and stunted grass. To the southward, a small lagoon, about 8 miles in extent, is connected with the larger one, and is navigable. It is known as *fort Lagoon*, but whales seldom go into it. The lagoon contains several islands, covered with stunted grass and weeds, with the exception of two, which are supposed to contain guano, although this conclusion is not yet well established. The distance from the bar to the western border is between 80 and 40 miles, but counting the northern lagoons already described, and which are believed to have been at one time a portion of the main one, this body of water would be upwards of 70 miles in extent. The breadth is between 20 and 80 miles. In every part, except close to the shore, may be found, from 2 to 5 fathoms, and good anchorage everywhere."

NATIVIDAD ISLAND.—At about $8\frac{1}{2}$ miles westward from Morro Hermoso, the west extremity of point San Eugenio, is the east end of Natividad island, the position of which is considered to be lat. $27^{\circ} 52' 30''$, 10° $115^{\circ} 11' 45''$. The island thence extends 8 miles in a W. by N. $\frac{1}{4}$ N.

direction, with an average breadth of $\frac{1}{4}$ a mile. Its height is supposed to be 700 feet. It is extremely barren, as neither tree nor scrub is to be found upon it, and it is only frequented by sea-fowl for a breeding place. From an islet off its north-west end several cargoes of guano have been taken. The depth at 2 miles westward from it is 35 to 40 fathoms.

In the middle of the channel separating Natividad island from the coast the depth is 17 to 20 fathoms; more than ordinary care is however necessary when running through it on account of a reef, upon which the sea breaks heavily in bad weather, reported to exist at about a mile eastward of the Sail rock*,—in fine weather the sea breaks upon it only at intervals. The tides run through this channel with some strength at the period of full and change.

CERROS ISLAND.—This large island extends between latitudes $28^{\circ} 2'$ and $28^{\circ} 19'$;—its north point is considered to be in lat. $28^{\circ} 19'$, long. $115^{\circ} 14'$. It is very lofty and can be seen from a considerable distance, appearing when first in sight with a very irregular and broken outline. The southern part, the highest, has probably an elevation of not less than 2000 feet. The depth at less than a mile from its shores is about 40 fathoms, with the exception that a bank of $5\frac{1}{2}$ to 10 fathoms extends 8 miles South from its south-east point, in the direction of the west end of Natividad island and to nearly the middle of the channel between them. In the *Mercantile Marine Magazine*, Vol. for 1860, is the following account of this island.

"Cerro is an island of mountains throughout its whole extent, being a mass of high, abrupt peaks, the highest of which is 2500 feet above the level of the sea, and may be distinctly seen, in clear weather, 60 miles. On a near approach, the sombre, barren appearance of all brought to view is anything but inviting. Many of the southern slopes present a dark red hue, interspersed with high variegated cliffs, that give a little change to the otherwise dull scene. On landing, one is at once fully sensible of the extreme dry atmosphere prevailing; still there must be, occasionally, heavy rains, producing mountain torrents, which have cut their way through the sand and gravel bottoms that skirt the southern bases. These, however, are of rare occurrence, for whalers best acquainted with the island, who have been living temporarily there, or along the neighbouring coast for the last five or six years, have never known it to be visited by anything more than light rains, and those at long intervals.

On the N.E. side, at about 8 miles from the extreme north end, a low sandy point makes out; southward of this is good anchorage during the prevailing coast winds. In a ravine near it, is a small stream of fresh water; and likewise in several of the valleys leading from the shore line, to the southward, water may be found within a mile of the beach. At one of these places it is of excellent quality. The only practicable place, however, for a ship to obtain a large supply, is on the S.E. side, where there is a spring running among rushes at the foot of a high peak close to the shore. The casks are filled by placing them within a few feet of the running stream, and conducting the water into them by means of a rough wooden spout, on the side of which are the words:—"Whoever uses this will please to put it in its proper place, for the benefit of those who may come for water."

* Not named in the chart by Captain Kellett, R.N., No. 2795.

Anchorage may be had off this spring, within two cables' length of the shore, in 20 fathoms of water; but a much better place for a ship to lie is 2 miles further south, off a low shingle beach—where it is not so deep, and the gusts that come down the mountains, when the wind is from the west, are not nearly so heavy as at the other anchorage.

A vessel can always find shelter from the N.W. winds on the south side of the island, in depths varying from 6 to 25 fathoms; these winds blow with the regularity of a 'trade,' from May to October, and the only precaution to be kept in mind in choosing an anchorage is to avoid fixed kelp. From October to May the winds are generally light and the weather delightful. Occasionally a strong 'norther,' or a light S.E. gale, blows the first part of the winter, and strong gales from the N.W. again set in about the 1st of May.

It is said by those well versed in such things, that there is every indication of extensive mineral deposits, in the shape of quartz rock and copper, scattered over many parts of Cerros island. Whether they really exist there remains to be proved."

SAN BENITO ISLANDS.—These three barren islands are situated about 14 miles westward from the north end of Cerros. They occupy an extent of 8 miles in an E. by N. and W. by S direction, and two of them are of moderate height; the middle one has only little elevation. Reefs surround them, which are intersected by narrow channels reported to be only sufficiently deep to permit the passage of boats or of small vessels of very light draught. It is said that there is anchorage on the south-east side of the middle island, in from 10 to 20 fathoms, but that the place is by no means inviting as the holding ground is far from good and the bottom is rough and rocky. The centre of the westernmost (the largest) island is considered to be in lat. $28^{\circ} 15' 30''$, long. $115^{\circ} 38' 15''$.

The Coast.—The coast within Cerros island, as already noticed, is very little known; it contains several bays, but the only one of which we have any description is that named Playa Maria, an open roadstead of 6 to 9 fathoms. On the eastern side of this bay is a mountain named the Nipple, 1192 feet high, from which Cerros island bears between the angles of S. $49^{\circ} 40'$ W. and S. 88° W., (*true*). Vessels may anchor here in about 6 fathoms, but as the roadstead is quite open to westward and south-westward and winds from those quarters send in very heavy seas, it is not considered a desirable place. The west point of the bay is in about lat. $28^{\circ} 55' 37''$, long. $114^{\circ} 31' 20''$.

SAN QUENTIN.—From Playa Maria bay the coast trends 114 miles in a north-westerly direction to port San Quentin, and is almost unknown. This port is of no commercial importance, and is very rarely visited. It was surveyed in 1889 by Captain Sir E. Belcher, R.N., and it appears by his published plan that an extensive flat of $2\frac{1}{2}$ and $1\frac{1}{2}$ fathoms stretches across the entrance of the port, but leaves a narrow channel of 4 to 7 and 8 fathoms close to its western side. This sandy flat has several dry patches on it. The point on the western side of the entrance is considered to be in about lat. $30^{\circ} 21' 58''$, long. $115^{\circ} 56' 33''$.

Sir E. Belcher observes of this bay. "The whole coast is dreary, being either sand-hills or volcanic mountains, five of which, very remarkably placed, caused one of the early navigators to term it the bay of Five hills. It is the bay of the Virgins of former, and port San Quentin of the later Spanish surveyors. The island and paps of Las Virgines are situated to seaward, about 2 miles from what has been termed Observatory peak, in our plan."

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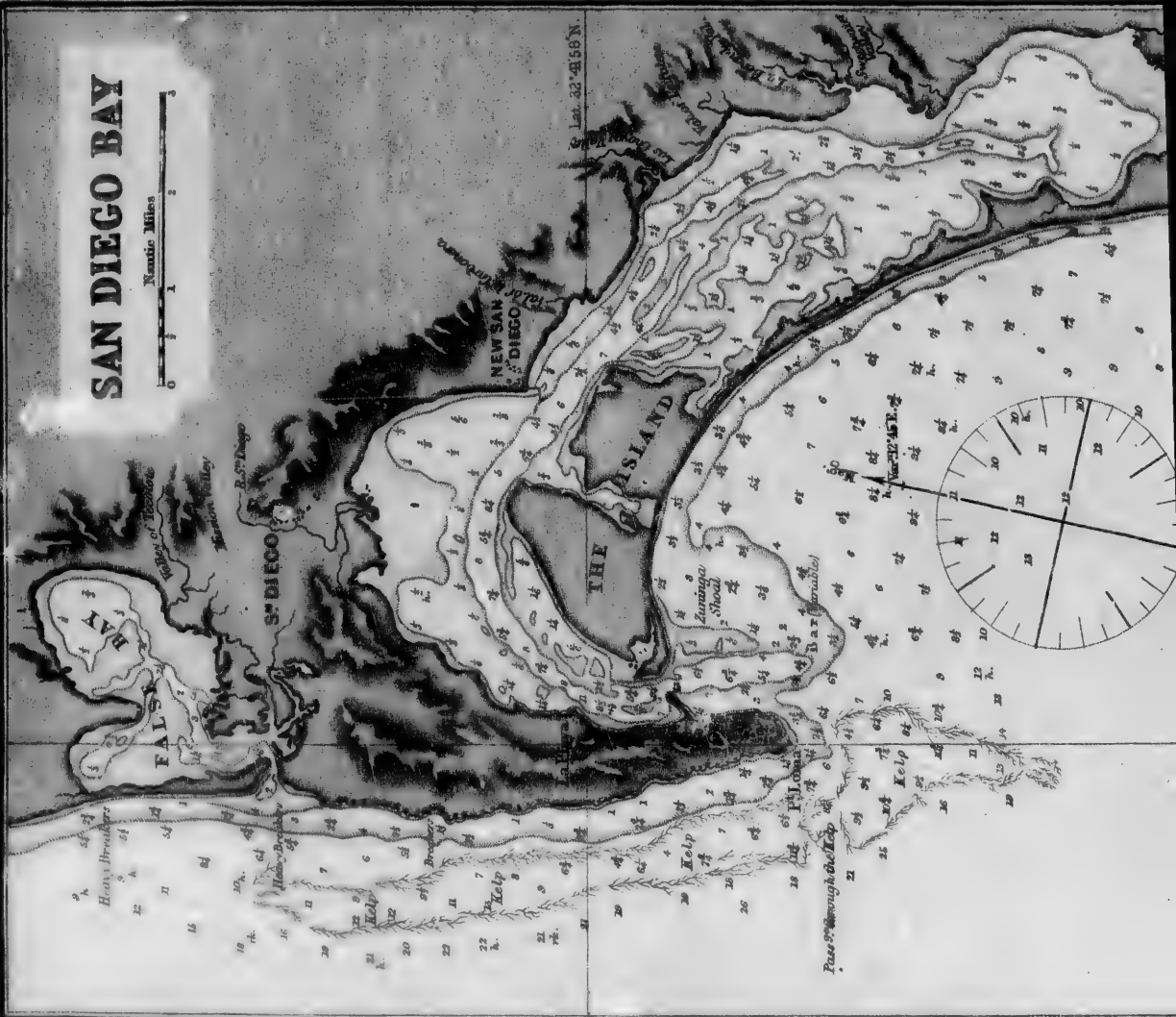
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SAN DIEGO BAY



The Coast.—From port San Quentin to San Diego, a distance of about 160 miles in a north-westerly direction, the coast is unknown, with the exception that in about lat. $30^{\circ} 59' 45''$, long. $116^{\circ} 16' 22''$, there is a small open bay, named Colnett, in which vessels may anchor in from 10 to 8 fathoms during the prevalence of easterly and northerly winds. At about 18 miles southward of San Diego are the Coronados islets, which are an excellent mark for the port when approaching it from southward.

CORONADOS ISLETS.—These rocky islets lie 7 miles from the coast, and the highest and largest of them is in lat. $32^{\circ} 28' 46''$, long. $117^{\circ} 18' 21''$. They form a group of high, bold, and abrupt rocks and islets, of which the largest (15 miles S. 11° E. from point Loma, San Diego,) is about $1\frac{1}{2}$ miles in length by $\frac{1}{2}$ of a mile in breadth, lying in a N.W. and S.E. direction. It is a wedge-shaped mass, 575 feet high, entirely destitute of trees.

At about a $\frac{1}{2}$ of a mile eastward of the islet there is anchorage; and, there is but one landing place upon it, which is difficult.

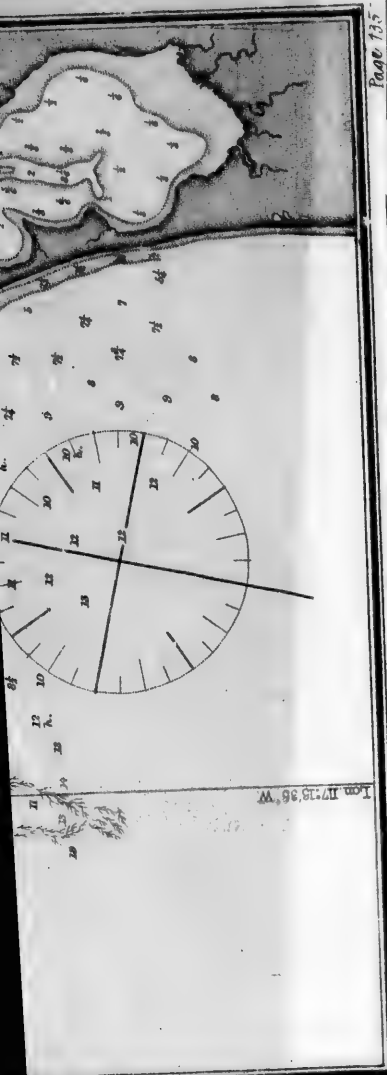
On the west and north-west sides of the islet, and at about $\frac{1}{2}$ a mile distant, are two smaller islets, or rather masses of rock about 50 feet high, and destitute of vegetation. Excellent anchorage is said to exist in the vicinity. The smaller of the two prominent islets is about $\frac{1}{2}$ a mile in length, lies N. 58° W. from the larger, and is distant $2\frac{1}{2}$ miles; it is a high barren rock, with a very sharp summit.

The Coast.—Upon the table bluff rising from the low land south of San Diego bay, is a monument marking the western point of the boundary between Mexico and the United States. It consists of an obelisk of white marble, about 20 feet in height, resting upon a pedestal. It stands near the edge of the bluff, about 200 yards from the shore, and its position is lat. $32^{\circ} 81' 58'' 46$, long. $117^{\circ} 6' 11'' 12$. Hence the coast is low and flat, running N. by W. for about 7 miles, and then curving gradually westward until it is nearly East and West at the entrance of San Diego bay. In the interior are high mountains.

SAN DIEGO.—The port of San Diego is formed on the *west* side by a bold projecting point of land, of which the southern extremity is named point Loma; and, on the *east* side by low flat land covered with thick bushes and grass, named the 'island', although it is really a peninsula—being connected to the eastern shore by a very low and narrow strip of beach. Upon point Loma there is a lighthouse, which shows a *fixed* light at 457 feet above the sea, visible 25 miles; its position is lat. $32^{\circ} 40' 15''$, long. $117^{\circ} 18' 80''$.*

Point Loma is the termination of a remarkable narrow spur of coarse, crumbling sand-stone, which rises south of Puerto Falso, or False bay, and west of the town of San Diego, to the height of 800 feet, and after stretching south for about $5\frac{1}{2}$ miles, gradually increasing in height to 422 feet, terminates very abruptly. It is covered with coarse grass, cacti, wild sage, and low bushes.

* See the plan of the harbour of San Diego on the chart of the coast of California, issued by the publishers of this work (Messrs. IMRAY AND SON). In this chart are inserted plans of most of the harbours on the coast between cape Corrientes and San Francisco. The port of San Diego is fronted by a bar which is tolerably permanent in its general features; the instructions here given for it are from the United States Coast Survey Report for 1862.



Next to that of San Francisco, no harbour on the Pacific coast of the United States approximates in excellence that of the bay of San Diego. It is readily distinguished, easily approached, and a depth of 22 feet can be carried over the bar, which is $\frac{1}{2}$ of a mile east of the southern extremity of point Loma, and between it and the tail of the Zununga shoal. The bar is about 650 yards across from the outer to the inner 5-fathom lines.

Vessels coming from north-westward make the ridge of point Loma as a long, flat-topped island, when about 25 miles distant. This appearance is occasioned by the bay to the south-west, by the low land to the north-east, and by the Puerto Falso at the north.

A thick field of kelp lies along the western shore of point Loma, the inner edge being but 1 mile off-shore, and having a breadth of $\frac{1}{2}$ a mile. The outer edge marks the line where the depth of water suddenly changes from 20 to 10 fathoms. The field commences off the bar at the entrance to False bay, and stretches southward $2\frac{1}{2}$ miles south of point Loma. Approaching the south end of Loma, along the outer edge of the kelp, pass through a partial break in it, and when the point bears N.E. by E., distant $1\frac{1}{2}$ miles, keep along the northern edge of the kelp in 4 fathoms, and about $\frac{1}{2}$ a mile from the point.

As soon as the point is passed, a long, low beach of shingle is opened, making out from the east side of the point and forming a natural breakwater, formerly called Punta de Guiranas* by the Spaniards, but now designated as Ballast point.

Round up gradually until Ballast point is brought in range with the easternmost house of La Playa, (distant 1 mile from Ballast point and on the same side of the bay,) and be careful not to open more of the village, as the shoal called Barros de Zununga† stretches south from the east side of the entrance, parallel to the ridge of point Loma, and distant only $\frac{1}{2}$ of a mile from it. Between point Loma and this shoal runs the channel, which is less than $\frac{1}{2}$ a mile wide within the 8-fathom lines. With the least swell the breakers show the position and extent of the shoal, and at low tides part of it is bare. It has been said that a rock, having but 5 or 6 feet of water upon it, lies in the channel; its position being marked by a patch of kelp, which is, however, torn away in heavy weather. The pilot boat *Fanny* reported being upon it in 1851, but the examinations of the Coast Survey have developed no such danger, and the report has been generally discredited.

During the summer keep as close to point Loma as the draught of the vessel will permit, and lay on the wind up to Ballast point, off which 4 fathoms can be carried within a ship's length, with 10 fathoms in mid-channel, and a very strong current on the ebb and flood tides; the former setting over the Zununga shoal. After passing Ballast point steer for La Playa, and anchor anywhere in from 4 to 10 fathoms, with good holding ground. Inside the point, and about 250 yards N. by W. from it, is a shoal having only 12 feet water upon it, in a line from Ballast point to the westernmost house at La Playa. It is a $\frac{1}{2}$ of a mile long. The shoals on the starboard hand, after entering, are plainly in sight, except at very high water. The channel, however, is buoyed, and cannot be missed. From La Playa to New San

* Or Punta de los Gujarras.

† Named by Viscaino in 1602. Don Gaspar de Zuniga, Count de Monterey, despatched the expedition.

Diego, 4 miles distant, the channel curves to the right and contracts, but about 6 fathoms water may be carried that far. A mile or two beyond the town the bay becomes shoal and filled with flats, yet a very narrow 8-fathom channel runs close along the eastern shore, nearly to the head of the bay.

Coming from the south, run for the extreme end of point Loma until Ballast point and La Playa are in range, as before, and follow the foregoing directions.

When inside the harbour vessels are perfectly safe, but during very heavy southerly weather the kelp is said to drive in such masses as to make vessels drag their anchors. We have never known such a case, and doubt if a vessel with good ground tackle and proper attention would suffer from this cause. Certainly there is not reach enough for the wind to raise a swell, and the holding ground is excellent. In heavy south-east weather the sea breaks over Ballast point, and in 1851 the pilot boat *Fanny* was piled upon it.

From Ballast point the bay runs about north for $1\frac{1}{2}$ miles; thence curves gradually to the eastward for 8 miles to New San Diego; thence to the head of the bay, south-east, 7 miles. The average width of the bay after passing La Playa is $1\frac{1}{2}$ miles, but at New San Diego, after contracting to a trifle over $\frac{1}{2}$ a mile, it again expands to about $1\frac{1}{2}$ miles, with low shores and extensive marshes and flats.

Tides.—At La Playa the corrected establishment is 9h. 88m. The mean rise and fall of tide is 3.7 feet; of spring tides 5 feet; and of neap tides 2.3 feet. The mean direction of the flood is 6h. 25m.; of the ebb 6h.; and of the stand 0h. 80m.

Captain Sir E. Belcher, R.N., has observed "Port San Diego, for shelter, deserves all the commendation that previous navigators have bestowed on it, and, with good ground tackle, a vessel may be perfectly land-locked. The holding ground is stubborn, but in heavy southerly gales I am informed anchors 'come home,' owing to the immense volume of kelp driven into the harbour. It was stated to me by an old sailor in this region, that he has seen the whole bank of *fucus giganteus* (which comprises a tongue of 8 miles in length by a $\frac{1}{2}$ broad) forced by a southerly gale into the port. This, coming across the bows, either causes the cable to part, or brings the anchor home. No vessel, however, has suffered from this cause. The chief drawback is the want of fresh water, which, even at the presidio, 8 miles from the port, is very indifferent."

Commander Wilkes U.S. Navy observes as follows—"Port San Diego is of considerable extent, being, in fact, an arm of the sea. It is 10 miles long, and 4 miles wide, and, from being land-locked, is perfectly secure from all winds. The entrance is narrow and easily defended, and has a sufficient depth of water, 20 feet at lowest tide, for large vessels. The tide rises 5 feet, The tongue of kelp off the entrance of the bay, must be avoided by large vessels, but small vessels may pass through it with a strong breeze. During gales, this kelp is torn up and driven into the bay, where it becomes troublesome to vessels by the pressure it brings upon them, either causing them to drag their anchors or part their cables.

There are many drawbacks to this harbour; the want of water is one of them, the river which furnishes the mission with water disappearing in the dry season before reaching the bay; and, the surrounding country may be called a barren waste of sand-hills. The town is situated on the north side of the bay, on a sand flat 2 miles wide. The mission establishment is 7 miles

from the town, up a valley to the north-east; and here, there is a good supply of water the year round. This river, in the rainy season, discharges a considerable quantity of water into the bay, bringing with it much sand, which has already formed a bar across a part of False bay, rendering it useless, and well grounded fears may be entertained that it will eventually destroy this harbour also; this occurrence, however, may be prevented at slight cost.

The whole country around San Diego is composed of volcanic sand and mud, mixed with scoria. The land is unfit for cultivation, and covered with cacti, one of the many evidences of the poorness of the soil; this leaves the port of San Diego little to recommend it but the uniform climate, good anchorage, and security from all winds."

The Coast.—At the north end of the ridge of point Loma is an extensive shoal bay called *Puerto Falso*, or *False bay*. The bar at its entrance lies N. by W. $\frac{1}{2}$ W., distant $5\frac{1}{2}$ miles from the southern extremity of point Loma; and having but 8 feet of water, it can be crossed only in the smoothest weather. The entrance just inside the line of heavy breakers is about a $\frac{1}{4}$ of a mile in width, but rapidly contracts to less than $\frac{1}{4}$. The northern point of this bay is about 2 miles in length, very narrow, and covered with low sand dunes. To the north and west of this the shore becomes compact and unbroken, except by the valleys of San Luis Rey and San Juan Capistrano. The waters off this stretch of the coast is named the bay of Santa Catalina.

From the southern extremity of point Loma the coast runs N. by W. for 22 miles; thence to the east point of San Pedro bay, N.W. by W. $\frac{1}{2}$ W. nearly 60 miles.

San Luis Rey.—In this extent of coast occurs the mission of San Luis Rey, the largest in California, situated in about lat. $33^{\circ} 17'$, long. $117^{\circ} 29'$. It is in a part of the country unequalled for salubrity and productiveness, but the scarcity of rain is an insuperable drawback to its prosperity. The anchorage is very restricted and scarcely ever visited, as it is quite open to westerly and southerly winds.

San Juan Capistrano, a mission similar to that of San Luis Rey, is situated in about lat. $33^{\circ} 28'$, long. $117^{\circ} 48'$. The anchorage is rocky in soundings of less than 5 fathoms, and is unprotected; the landing is also bad. The bay is formed by a high cliffy head to the north-west, and terminates in a southerly direction in low sandy beaches. It is stated that when entering it from north-westward some care is required to give the bluff point a wide berth, because some dangerous rocks lie off it to a considerable distance.

Commander Wilkes, U.S.N., says "This bay has at its head a fertile valley, in which is situated the town and mission of San Juan. The bay is entirely unprotected, and is a bad roadstead, the bottom being very foul inside of 5 fathoms, and the landing at times impossible, on account of the surf. It can be safely visited only during the fine season. Provisions and water are easily obtained; the latter from the mountain streams, which empty into the bay, and also enable the inhabitants to irrigate their lands, by which mode of cultivation they are made extremely productive. The shore here becomes quite bold, making the communication to the northward by the land very inconvenient."

From San Juan Capistrano to point Fermin on the west side of the bay of San Pedro, the distance is about 80 miles in a W. by N. $\frac{1}{4}$ N. direction; the space included between is known as the bay of Los Tremblores. The cliffs along this part of the coast are steep, and composed of clay and chert,

throughout which are interspersed chalky lumps, which contain organic remains. Only very little water is to be obtained here, and the little that is required for the supply of the inhabitants has to be brought from a distance in the interior. San Pedro hill, over point Fermin, is 1600 feet high.

SAN PEDRO.—This bay is formed on the west side by the high bold land of which point Fermin is the extremity, and on the east side by the low coast of the main land. It is open to all points from S.W. by the southward to S.E., and is consequently exposed to the full force of the winter gales; but during spring, summer, and autumn, it is an excellent roadstead. A little islet, named El Moro, lies $\frac{1}{4}$ a mile from the beach, and has close to its east side a depth of 18 to 12 feet; between it and the shore there is no passage.

At about 20 miles in the interior, almost North from San Pedro, is the town of Los Angeles, which is the centre of an extensive grazing, agricultural, and grape growing country. The quantity of grapes, and fruits generally, shipped from San Pedro to San Francisco during the proper season, is already enormous, having amounted in 1862 to not less than 2,000,000 lbs. The coasting trade of this place is now greater than the aggregate trade of all the other ports south of San Francisco.

From point Fermin a line of bold bluff runs exactly north and south for about 2 miles, and averages 60 feet in height. Point Vincente, the western point of the high land of San Pedro, is also bold and has deep water in its immediate vicinity.

Vessels approaching San Pedro bay from *westward* through the Santa Barbara channel make San Pedro hill, as an island projected against the mountains to the southward and eastward. Approaching point Vincente, which is the south-west point of the hill, vessels can keep it close aboard, there being from 50 to 80 fathoms within a mile of the shore; round point Fermin within $\frac{1}{4}$ a mile, in from 6 to 10 fathoms, and over the small island El Moro, run for that island, and when abreast of the landing (readily recognized by the houses on the bluff,) about 1 mile north of point Fermin, anchor in 8 fathoms, hard bottom, at $\frac{1}{4}$ a mile off shore. Vessels must anchor a mile off to get 5 fathoms.

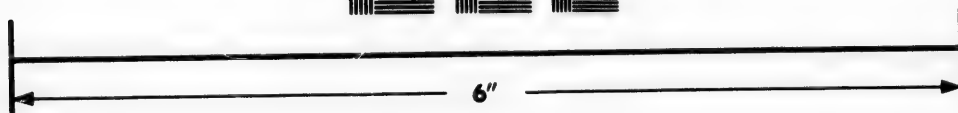
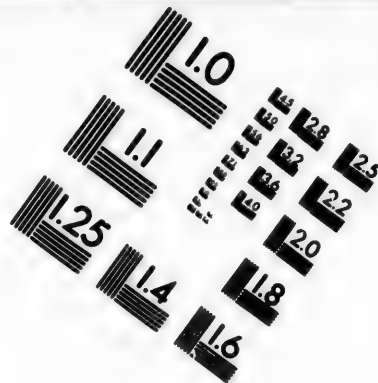
Coming from the *southward* with north-west winds, beat in boldly until abreast of the landing; keep the lead going and anchor anywhere in its vicinity. Do not approach the low shore, to the north and east of El Moro, closer than 1 mile, at which limit 4 fathoms water will be found.

In winter, anchor further out, and more to the southward, in order to be able to slip the cable and go to sea should a heavy south-easter spring up.

The waters of the lagoon, inside of the low sandy beach, and a mile or more northward of El Moro, find their principal outlet between that island and the bluff point $\frac{1}{4}$ a mile west of it. The entrance is very narrow and crooked, and has or had two buoys, about 200 yards apart, to mark it. In 1859 it was stated that the "bar at the entrance to the creek remains about the same, as it did in 1852. At mean low water, throwing out the half tides, only 2 feet of water can be carried over it." A small tow-boat is now, we believe, used for taking vessels to New San Pedro, situated about 8 miles inside the bar.

Wood and water are not readily obtained, and charges are high. The beach raised here is remarkably tough.

The position of the landing place, W.S.W. $\frac{1}{4}$ S. from El Moro, is considered to be lat. $88^{\circ} 48' 20''$, long. $118^{\circ} 16' 8''$. The corrected establishment of the



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port is 9h. 30m. The mean rise and fall of the tides is 8·7 feet; of spring tides 4·7 feet; and of neap tides 2·2 feet.

Santa Anna Lagoon.—At about 15 miles from San Pedro in an E. $\frac{1}{2}$ S. direction, is the Santa Anna lagoon which receives the waters of the Santa Anna river. When examined in 1861 it was found to be some 5 miles long, and separated from the ocean by a narrow strip of low sand beach, over which washes the heavy swell from the north-west and south-east. The lagoon has a breadth of only a few hundred yards, and a mouth about 50 yards in width, with a narrow bar, upon which it is supposed 10 or 12 feet of water might be found at high tide. On this bar there is a very heavy break at all stages of the tide, rendering it dangerous to cross in boats of any kind. There is said to be no safe anchorage off the entrance, and the low straight beach, with a trend nearly east and west, affords no protection whatever. The San Pedro wind gap lies between San Pedro hill and the Sierra San Juan, to the south-east of the Santa Anna, and the summer winds draw directly on the land, causing the north-west swell to roll upon the beach with great force. In winter the south-east and south-west swell breaks square upon this whole line of coast, and would prevent any vessel passing into or out of the lagoon, or riding at anchor near it. In summer the Santa Anna is said to frequently dry up before reaching the lagoon.

The Coast.—From point Vicente the coast trends N. by W. $\frac{1}{2}$ W. 17 miles; thence W. by S. to point Duma, in lat. $34^{\circ} 00'$, long. $118^{\circ} 41'$; thence to point Mugu, W. $\frac{1}{2}$ N. 17 miles,—the last point lies N.E. by E. $\frac{1}{2}$ E., distant 12 miles from the eastern end of Anacapa. This long curve in the coast is known as the Bahia Oña. Point Duma rises into a dome-like form 202 feet high. The land immediately behind it falls away, so that in making it from westward it rises into view as an island close under the high mountains. Eastward of point Duma the mountains spring directly from the water.

From point Mugu to San Buenaventura, distant 17 miles, the coast has a general trend N.W. by W.; but, about midway, it curves south-westward of this course $2\frac{1}{2}$ miles towards Anacapa, thus contracting the eastern entrance to the Santa Barbara channel. Two miles westward of point Mugu is Laguna point, close under which is very deep water, the 10-fathom line running within 250 yards of the shore. Between point Mugu and Buenaventura the coast is low, flat, and sandy, being the opening of the valley of Santa Clara, through which flows the Santa Clara river; this stream is nearly dry during the summer, and terminates in lagoons and marshes, but in the rainy season a volume of water is brought down having sufficient force to break through the narrow sand beach and flow into the ocean.

The eastern entrance to the Santa Barbara channel lies between the eastern end of Anacapa island and point Hueneme, which is about half-way between point Mugu and Buenaventura. From Anacapa, point Hueneme bears N.E. by N. $\frac{1}{2}$ N., distant $9\frac{1}{2}$ miles. Directly off this point is found a remarkable example of a sub-marine valley, commencing with a depth of 10 fathoms, 400 yards from the beach, increasing to 50 fathoms in $\frac{1}{4}$ of a mile, and to 118 in less than two miles. Its general direction is South, with a width of a mile, and bounded on either side by depths of 12 and 15 fathoms. The best landing is directly on the point; landing in the bight eastward and leeward of it is impracticable.

There is excellent holding ground off Buenaventura in 10 fathoms, but the landing is not good. The 8-fathom line lies about a $\frac{1}{4}$ of a mile off-shore.

The mission of Buenaventura, situated at the foot of the dividing ridge of the valleys of San Buenaventura and Santa Clara, about $\frac{1}{4}$ a mile from the shore, was founded March 31st 1782. Its position is about lat. $84^{\circ} 15'$, long. $119^{\circ} 15'$.

At about 15 miles westward of Buenaventura, on the coast, there is a rich deposit of sulphur, surface specimens of which have yielded 60 per cent. Around the locality are found ashes and scoria. The ground is hot, and the gas emitted is almost suffocating.

SANTA BARBARA.—From San Buenaventura the coast trends nearly W. by N. 28 miles to Santa Barbara. This roadstead is open to all winds except those directly from northward; it is however somewhat sheltered by the islands Santa Cruz, Santa Rosa, and San Miguel from the heavy swell sent on the coast by south-west winds. The depth at $\frac{1}{4}$ a mile from the beach is 6 fathoms, and it is believed that no sunken dangers exist in the kelp which prevails in some profusion along the shore. When there is any swell the surf is very bad, not falling square on to the beach but cutting it at a sharp angle; at this time landing is difficult. There is anchorage within the line of kelp in about 4 fathoms, which is resorted to in summer, but not in winter, because at the latter season the gales detach and drive it shoreward in such vast quantities that, coming across a vessels' hawse, it helps to bring home her anchors. We believe that vessels generally put to sea when there are indications of a gale coming on from south-eastward.*

The shore at Santa Barbara consists of a low sandy beach, which is terminated to the westward by a bold bluff, named point Castillo. The hill over this bluff is known as La Vigia. The usual landing place is at about $\frac{1}{4}$ a mile eastward of point Castillo. The shore is low and flat as far as the town, $\frac{1}{4}$ of a mile distant, but gradually rises to the mission, a prominent object about 2 miles inland.† The town is of considerable importance; it is situated in the midst of a rich agricultural district, running east and west at the southern base of the Sierra Concepcion, but of limited breadth. The trade with San Francisco is not extensive; but this being one of the greatest stock-raising districts on the coast, vast droves of cattle pass through and are sent to San Francisco and the mining districts. Regular communication by steamers and sailing vessels is maintained with San Francisco and other ports. Wood and provisions in abundance can be obtained here. Water is plentiful, but not so readily procured.

As a guide to vessels approaching Santa Barbara from westward and south-eastward, a lighthouse has been erected on the point at about 2 miles south-westward from the landing place. It stands 188 yards from the edge of the

* See the plan of Santa Barbara on the chart of the coast of California, published by Messrs. Imray and Son.

† This mission is about 200 feet above the sea. It was founded December 4th, 1786, and soon became one of the largest and best establishments of the kind in California, and in the gardens attached to it the grape and olive were cultivated with success. In the town of Santa Barbara there is a grape-vine which yielded during the year 1868 over 2000 lbs. of grapes. A single stem rises from the ground a height of 5 feet, and its branches supported by poles, cover a very large area. At the base the trunk measures 2 feet in circumference.

bluff, and shows a *fixed* light at 180 feet above the sea, visible 12 miles. Its position is considered to be lat. $34^{\circ} 28' 85''$, long. $119^{\circ} 42' 5''$.

If approaching Santa Barbara from *westward* and *south-westward*, the hill La Vigia will be a prominent object. Steer for the hill, and upon approaching the anchorage keep outside the line of kelp (here nearly $\frac{1}{4}$ a mile wide); gradually round the point upon which is situated the lighthouse, and keep along the kelp until abreast of the town, off which anchor in 7 fathoms. Or, pass through the kelp and anchor inside of it in $8\frac{1}{2}$ fathoms, hard bottom. Outside the kelp in 9 or 10 fathoms, the bottom is sticky; vessels occasionally anchor here.

The approach to Santa Barbara from *eastward* or *south-eastward* requires no special remarks. Vessels may pass either eastward or westward of Anacapa island.

Captain John Hall's experience of Santa Barbara agrees with the foregoing—"this bay is only sheltered from the N.W. winds, being exposed to the South and S.W. The anchorage is not very good, being hard sand, and overgrown with sea-weed. We had such a quantity of this on our anchor when we hove it up, that it entirely impeded the ship's progress until we got it clear. We found no tide or currents, but there appeared to be a rise and fall, in-shore, of about 2 feet. All kinds of provisions are cheap here, as also fruits, viz.—grapes, pears, apples, and plums, in the season."

Vancouver has remarked of Santa Barbara, "To sail into the bay requires but few directions, as it is open, and without any kind of interruption whatever; the soundings on approaching it are regular, from 15 to 8 fathoms; the former, from $1\frac{1}{4}$ to 2 miles, the latter within $1\frac{1}{4}$ cables' length of the shore. Weeds were seen growing about the roadstead in many places; but, so far as we examined, which was only in the vicinity of our anchorage, they did not appear to indicate shallower water, or a bottom of a different nature. The shores of the roadstead are for the most part low, and terminate in sandy beaches, to which, however, its western point is rather an exception, being a steep cliff, moderately elevated."

The Coast.—From the lighthouse at Santa Barbara the coast trends W. by S., 87 miles to point Concepcion. At a very short distance behind the coast is a range of rugged hills, over 2000 feet high, forming part of the Sierra Concepcion (sometimes called the Sierra San Inez), whose sides are sparsely covered with timber, and through some of whose gullies and gorges pass small streams abounding in the finest trout; from others issue warm springs having a temperature of about 117° Fahrenheit, and highly impregnated with sulphuretted hydrogen;—these springs are behind the village of Montecito, eastward of Santa Barbara, and by barometric measurement are about 1200 feet above the sea.

At about 8 miles westward of Santa Barbara is a large bitumen pit, which empties directly into the sea, and the bitumen, floating on the water, works *against* the summer or north-west winds even beyond point Concepcion. Very frequently, in calm weather, a great extent of the surface of the channel becomes iridescent from the thin film of bitumen spread over it. The rocks along the shore, even westward of point Concepcion, are covered with it. Sulphur, in large beds and of superior quality, also exists along the seaboard, and manifests itself in all the warm springs.

El Coxo.—At about 2 miles eastward of point Concepcion is the anchorage of El Coxo, off the entrance to the valley of that name. This anchorage is

better than that off Santa Barbara, and the kelp is not so compact. When approaching it from westward, pass point Concepcion at the distance of about $\frac{1}{2}$ of a mile, steer E. by N. and gradually round the bluff which is a mile East from the point, giving it a berth of $\frac{1}{2}$ a mile; run on a N.N.E. course for $\frac{1}{2}$ of a mile, when the valley will open with a sand beach off it. Anchor outside or inside the kelp, according to the choice of depth; 5 fathoms being obtained within a $\frac{1}{2}$ of a mile of the shore, with hard, sandy bottom. At $\frac{1}{2}$ a mile from shore the depth is 10 fathoms. There is a large rancho at El Coxo, and it is one of the very best tracts for grazing. The beef has a finer flavour and more delicacy than any on the coast. At the head of the valleys and in the mountains is a species of large live oak, very brash when newly cut, but growing hard by seasoning. Willow, for fuel, and water can be obtained here, but neither in abundance. The water is disagreeable to the taste.

POINT CONCEPCION is a remarkable headland rising to the height of about 220 feet. It is so conspicuous and prominent an object, that it is said, when once seen it will never be forgotten. When made from northward, or from eastward, it rises as an island, but, a nearer approach, discovers it to be a high promontory, stretching boldly into the ocean, and terminating abruptly. The land behind it sinks comparatively low, and at first gradually, but soon rapidly rises to the mountains, which attain an elevation of about 2500 feet. Between 800 and 400 yards south of the face of the cape is a large rock nearly awash, upon which some of the California steamers have struck in very foggy weather.

Vancouver says of this point—"It is remarkable by its differing very much in form from the headlands to the northward. It appears to stretch out from an extensive tract of low land, and to terminate like a wedge, with its large end falling perpendicularly into the sea, which breaks against it with great violence. Off the point the current sets to the north in the early spring months."

The lighthouse upon point Concepcion is 85 feet high, and shows a light revolving every thirty seconds at 250 feet above the sea, visible 28 miles. The building is white, stands near the pitch of the point, and is considered to be in lat. $84^{\circ} 28' 47''$, long. $120^{\circ} 20' 38''$.* A fog-bell, stationed seaward of the lighthouse, is sounded in thick weather every $13\frac{1}{2}$ seconds.

From the lighthouse, Richardson rock off the west end of San Miguel island bears S. $\frac{1}{2}$ E. distant 22 miles; the east end of San Miguel island S.E. by S. $\frac{1}{2}$ S. 26 miles; and the south-west end of Santa Cruz island S.E. by E. $\frac{1}{2}$ E. 40 miles.

Mr. Davidson of the United States Coast Survey says—"Next to the islands of the Santa Barbara channel, point Concepcion is the most prominent and interesting feature between San Francisco and the peninsula of Lower California. It has very justly and appropriately been termed the 'cape Horn' and the 'Hatteras' of the Pacific, on account of the heavy north-westerns that are here met with on coming through the channel, with a great change of climate and meteorological conditions; the transition being remarkably sudden and well defined. An investigation of the temperature of the ocean, north-west and east of the cape, would be highly instructive, as some characteristics would

* These particulars of point Concepcion light are from the official list of Lighthouses of the United States, published at Washington, 1867. In the Coast Survey Report for 1862, the longitude is stated to be $120^{\circ} 27'$.

naturally be expected from the abrupt change in the direction of the mountains and coast line. We have frequently seen vessels coming from the eastward with all sail set, and light airs from the north, in a very little time reduced to short canvas upon approaching the cape, and vessels from the north-west coming before a spanking breeze loose it within a few miles after passing the cape into the channel. These last would be fortunate in reaching Santa Barbara in a day. We have known a vessel to be 8 days working from San Buenaventura to Santa Barbara, whilst a ten-knot breeze was blowing west of point Concepcion.

During some summer seasons the fog is almost interminable, but more particularly among the islands. For the space of six weeks, with clear days and nights at the cape, the islands have been invisible; rising, however, to an elevation of 1000 or 1500 feet, the observer plainly sees the summits of the islands over the sea of fog which envelops them.

When the fogs prevail, they generally roll in from seaward at sunset, and clear away about 10 o'clock next morning.

THE ISLANDS OF CALIFORNIA.

These islands commencing with the southernmost are named San Clemente, Santa Catalina, Santa Barbara, San Nicolas, Anacapa, Santa Cruz, Santa Rosa, and San Miguel. They are separated from the northern shore by the Santa Barbara channel, which is about 20 miles wide.

When making Santa Barbara channel from north-westward, shipmasters readily estimate their approach in thick foggy weather by the peculiar odour of the bitumen which, issuing from the large pit already mentioned (page 142) as situated on the shore about 8 miles westward of Santa Barbara and floating upon the water, works *against* the summer winds far beyond point Concepcion. This set westward is found to exist for about 4 miles from shore, and it runs at a maximum velocity of $1\frac{1}{2}$ miles per hour; further out the current is variable, but even there its greatest velocity is attained when running westward. From point Concepcion its direction is southward and westward, being doubtless influenced by a current from the upper coast.

Vancouver directs attention to this bitumen, as follows—"The surface of the sea, which was perfectly smooth and tranquil, was covered with a thick slimy substance, which, when separated or disturbed by any little agitation, became very luminous, whilst the light breeze that came principally from the shore brought with it a strong smell of tar, or of some such resinous substance. The next morning the sea had the appearance of dissolved tar floating upon its surface, which covered the ocean in all directions within the limits of our view, and indicated that in the neighborhood it was not subject to much agitation."

Sir Edward Belcher, in October, 1889, also observes—"Off this part of the coast, westward of Santa Barbara, we experienced a very extraordinary sensation, as if the ship was on fire, and after a very close investigation attributed it to a scent from the shore, it being more sensible on deck than below; and the land breeze confirming this, it occurred to me that it might arise from naphtha on the surface."

Among the islands, as far as San Nicolas, the current runs southward. On the Cortez shoal it frequently runs against the N.W. wind at the rate of nearly 2 miles per hour. At other times it has been found to run in an opposite direction with nearly as much strength.

The rainy season here commences in the early part of November, and continues until the middle of March. The quantity of rain that falls does not average over 15 inches, but some seasons are marked by excessive drought. During the winter S.E. gales prevail, and sometimes during the summer months southerly weather will bring up heavy rain.

Cortez Bank.—This bank, within the depth of 50 fathoms, has an extent of about 15 miles in a W. by N. and E. by S. direction, its east end being in lat. $82^{\circ} 24'$, long. $118^{\circ} 59' 80''$, and its west end in lat. $82^{\circ} 32'$, long. $119^{\circ} 17' 80''$. It has an average and nearly uniform width of $8\frac{1}{2}$ miles. The bottom is hard, composed of white sand, broken shells, and fine coral at the south-east portion; and sand, with broken shells, at the north-west. The shoalest and most dangerous part is that known as the Bishop rock, which is 5 miles from the south-east tail of the bank, and has but $2\frac{1}{2}$ fathoms of water upon it. Around this danger the depth increases gradually, and in an extent of $2\frac{1}{2}$ miles in the general direction of the bank reaches but 15 fathoms. The rock is considered to be in lat. $82^{\circ} 25\frac{1}{2}'$, long. $119^{\circ} 5'$, and from it the north-west end of the island of San Nicolas bears N.W. by N., distant 57 miles; and the south-east end of the island of San Clemente N.E. $\frac{1}{2}$ N. 46 miles.

A shoal spot of 10 fathoms is also situated in about the middle of the bank; it is of limited extent, being only $\frac{1}{4}$ a mile square within the 15 fathom curve. Its position is considered to be lat. $82^{\circ} 26\frac{1}{2}'$, long. $119^{\circ} 10\frac{1}{2}'$, and from it the north-west end of San Nicolas bears N.N.W. $\frac{1}{4}$ W., distant 54 miles; and the south-east end of San Clemente N.E. $\frac{1}{4}$ E., distant 50 miles. From the Bishop rock it bears W. $\frac{1}{4}$ N., distant 5 miles. North-westward of this shoal spot the depth is nearly uniform at 49 fathoms for $7\frac{1}{2}$ miles, and between it and the Bishop rock the depth is uniform at about 48 fathoms.

Upon the Cortez bank the current is variable, frequently setting against the strong N.W. winds with a velocity of nearly 2 miles per hour, and producing at all times a heavy swell, and even in moderate weather breaking heavily upon the rocks. When passing over the bank at night its locality may be known by the increased swell. In the detailed examination of 1856 it was found that the general set of the current was southward and eastward, and the greatest velocity $1\frac{1}{2}$ miles per hour; but no statement was made concerning the prevailing wind.

The Cortez bank lies in the direct route now followed by the Panama and San Francisco steamships, and was discovered by Captain Cropper, of the steamship *Cortez*, in March 1858. His position was determined by bearings of San Nicolas and San Clemente, and was very close, being within a mile of the latest and best assigned place. He says that the water around it was in violent commotion, and thrown up suddenly in columns at regular intervals of 4 or 5 minutes. At first he thought he saw breakers; and occasionally the water broke as on a reef, but he became confident that the disturbance was owing to submarine volcanic agency. The specimens of the bottom negative this idea. He found his depth of water reduced from 42 fathoms to 9, from which it is evident that he was on the shoal spot in about the middle of the bank, and saw the water breaking upon the Bishop rock,—the same appearance

that he witnessed having been seen many times since by others, and the nature of the rocky bottom and depth of water supporting the assumption. The position of the bank was afterwards more closely determined by the commander of the steamship *Pacific*; but in the Coast Survey operations the 10-fathom spot was found, and the surveying schooner used in that duty was anchored on it 5 days.

Attention was subsequently called to a more extended examination of the vicinity by the clipper ship *S. S. Bishop*, of Philadelphia, striking (1855) upon the rock since called by her name, and, under unfavourable circumstances, two points of rock were supposed to exist, to which approximate positions were assigned. In 1856 the bank was sounded over to the extent of 180 square miles; and from a consideration of the highly favourable circumstances under which this last survey was made, confidence is expressed that the point of rock above mentioned is the only one existing; but as it is very difficult to find detached single points of rock below the surface in a sea-way, it will not be surprising if others be eventually found. At all events a prudent navigator will give this bank a good berth. Its existence forcibly suggests the probability that other submarine ridges lie parallel to the coast.

SAN CLEMENTE is a lofty, bold island, the south end of which is in lat. $32^{\circ} 49' 30''$, long. $118^{\circ} 24' 15''$. From this point it extends 22 miles in a N.W. by W. direction, with an average breadth but little exceeding 2 miles, and at the same time gradually decreases in height. From its south extremity point Loma, San Diego, bears E. $\frac{1}{4}$ N. distant 60 miles. The island is very barren and neither wood nor water can be procured from it; the soundings around it show a depth of from 86 to 180 fathoms close in shore, except off the north-west point, from which a reef makes out about a mile.

At the north-west end of the island a small indentation of the shore line in lat. $33^{\circ} 2'$, long. $118^{\circ} 34'$, forms an anchorage having a width of $\frac{1}{2}$ of a mile, by $\frac{1}{2}$ a mile in depth, with soundings decreasing from 12 fathoms, (on the line of a large rocky islet at the west side to a point E. by S. from it) to 4 and 5 fathoms close in shore. Kelp will be found in 10 fathoms, but the bottom is tolerably regular and hard. It is anything but a pleasant or safe anchorage in bad N.W. weather, and even in heavy southerly weather the swell must roll in disagreeably.

There is also anchorage under the S.E. end of the island, in the deepest part of the indentation of the shore, but the bottom is rocky and irregular. The S.E. point is a vast sandstone pyramid; and when it is brought to bear North, and the shore $\frac{1}{2}$ of a mile distant, the anchorage will lie W. by N. $\frac{1}{4}$ N. $1\frac{1}{2}$ miles, inside the kelp, in 10 to 15 fathoms, and $\frac{1}{2}$ of a mile from the narrow sand beach at the foot of the cliffs. Outside of the kelp the depth ranges from 10 to 80 fathoms. This anchorage affords protection in heavy north-west weather.

SANTA CATALINA.—The south-west end of this island is in lat. $33^{\circ} 20'$, long. $118^{\circ} 17'$, and bears N. $\frac{3}{4}$ W. from the south-west point of San Clemente; thence the island extends W. by N. $\frac{1}{4}$ N., $17\frac{1}{2}$ miles, with an average breadth of 4 miles in its southern, and of 2 miles in its northern part. It is very lofty as it rises to the height of about 8000 feet, and is remarkable for a great depression, at 5 miles from its north end, which runs partly through it and forms a cove on each side, in either of which (according to the direction of the prevailing wind) vessels may anchor and obtain shelter. This depression in the island bears S.S.W. from point Fermin, San Pedro

bay, distant $18\frac{1}{2}$ miles. The land between the two coves is not more than 80 feet high; but the hills on each side rise to the height of 2000 or 8000 feet, so that when Santa Catalina is viewed from a good offing, North or South of it, it appears to be two islands.

The cove on the *south* side of the island, just alluded to, is only about $\frac{1}{4}$ of a mile in width, but its approaches are bold, and, so far as known, free from hidden dangers. To find it, run along the south-west side of the island and make for the depression; then stand in for the opening, keeping a little left of mid-channel until $\frac{1}{4}$ of a mile inside of the heads; thence keep in mid-channel until abreast of the long, low point on the right, and anchor in 5 fathoms, soft bottom. There is a depth of 8 fathoms immediately inside of the low point, with hard bottom, but not room enough for a vessel to swing. If the wind is blowing from the N.W., vessels will loose it at the heads, and perhaps require to be towed in.

The cove at the depression on the *north* side of the island is also small, with a reef in the centre and two large outlying rocks. A steamer could run in on the west side of the rocks, and anchor off the low beach in 10 fathoms, when the reef would lie N. by E. from her, distant $\frac{1}{4}$ of a mile. Small craft will here find protection from the prevailing winds, but experience difficulty in getting out, as there is always a swell setting in, and the wind blows in flaws and eddies on account of the high hills. Between the two points forming the anchorage the distance is $\frac{1}{4}$ a mile, and the depth $\frac{1}{4}$ of a mile. From observations made on the low shore of this cove its position has been ascertained to be lat. $38^{\circ} 26' 38''$, long. $118^{\circ} 28' 50''$.

The soundings around the island show deep water, from 19 to 75 fathoms, close in shore, with no outlying rocks except off the north cove. The shores are rocky, and on the southern side fearfully abrupt, but on the northern shore there are several indentations, where boats may land at almost any season. Deep and precipitous gulches are formed by the ridges of rock running diagonally across the island from N.E. to S.W., and occasionally a small valley varies the scene. A few settlers cultivate these spots, but their inconsiderable extent precludes the realizing of anything beyond a bare sustenance. At about mid-way between the north-west extremity of the island and the great break there is a spring of good water, and at the south-east point good water has been obtained by sinking wells to a depth of 50 feet or more, but in the intermediate places water found at the same depth is brackish. There is a large pond on the low land between the anchorages, but the water is very brackish. Scrub-oak is obtained for fire-wood, and a growth of thorny bushes covers the whole island, rendering travelling very difficult. The island is partially stocked with cattle and sheep, and at one time vast numbers of wild goats abounded, but they have helped to supply the California market with fresh meat.

SANTA BARBARA.—This little island is distant about 28 miles in a W. by S. direction, from the north end of Santa Catalina, and its centre is in lat. $38^{\circ} 30'$, long. $119^{\circ} 2'$. It is situated almost exactly mid-way between the north end of San Clemente and the east end of Santa Cruz, and at an equal distance from the shores of Santa Catalina and San Nicolas. Its extent does not exceed 2 miles of shore-line; its elevation at the highest part is about 500 feet, and the top has an area of about 80 acres covered with soil. There is no water, and not a vestige of wood.

The shores of the island are rocky and abrupt, presenting on the north-east

SAN NICOLAS AND ANACAPA.

and south sides perpendicular cliffs exposed to the full force of the sea. Landing is at all times difficult and dangerous. The water around it is deep, and there are no outlying rocks. It is said to be much more enveloped in fogs than the neighbouring islands.

SAN NICOLAS, is distant 25 miles S.W. from Santa Barbara, and is further from the land than any of the islands; it is also the driest and most sterile. It is 8 miles long W.N.W. and E.S.E., and has an average breadth of $8\frac{1}{2}$ miles. Its height is about 600 feet, and, like San Clemente, it is comparatively flat-topped, but falling to the southern end. The sides are bold and precipitous, and composed of coarse sandstone. The depth at a moderate distance from it is 10 to 48 fathoms; at $2\frac{1}{2}$ miles northward from it are soundings of 40 and 42 fathoms. From its north end point Fermin, San Pedro, bears N.E. by E., distant 67 miles.

The south-east end of San Nicolas island is a low sandy point, whose position is considered to be lat. $88^{\circ} 14' 12''$, long. $119^{\circ} 25'$. Vessels may anchor off this end of the island in 10 fathoms, hard bottom, but some inconvenience is occasioned by the steady southerly current; this makes a landing difficult, as the surf cuts the beach at an acute angle.

Breakers extend from the north end of the island about $2\frac{1}{2}$ miles, and it is said also from the southern point to the distance of $1\frac{1}{2}$ miles; this is doubtless in heavy weather.

Begg Rock.—At about 7 miles N.W. by W. $\frac{1}{2}$ W., from the north-west end of San Nicolas is the Begg rock, which is about 40 feet high, bold, and so well defined as to be distinctly visible from the distance of 10 miles. Its position is about lat. $88^{\circ} 22' 30''$, long. $119^{\circ} 89' 30''$.

The depth near the south-east side of the Begg rock is 62 fathoms, and near its north-west side 52 fathoms. Between it and San Nicolas, the bottom is irregular and rocky, and at nearly mid-way are soundings of 40 to 45 fathoms, coral.

ANACAPA, although always spoken of as one island is a curiously formed group of three islands, extending in nearly an E.N.E. direction 5 miles, and situated in lat. $84^{\circ} 1'$, and between longitudes $119^{\circ} 19'$ and $119^{\circ} 24'$; the actual position of its west end is considered to be lat. $84^{\circ} 0' 30''$, long. $119^{\circ} 24' 36''$. From its west end the east point of the island of Santa Cruz bears W. $\frac{1}{2}$ S. distant $4\frac{1}{2}$ miles; and, from its east end Santa Barbara light bears N.W. $\frac{1}{2}$ W., 28 miles, and point Hueneme, the nearest point of the main land N.E. by N. $\frac{1}{2}$ N., $9\frac{1}{2}$ miles.

The western island of Anacapa consists of a peak 980 feet in height, with a base of over 2 miles by $\frac{1}{2}$ of a mile; this is separated from the middle island by a gap 10 feet wide, through which boats can pass. The middle island is nearly 2 miles long by 500 yards wide, whilst the eastern island is little over a mile long by 500 yards wide. The gap separating the middle and eastern islands is over 200 yards wide, but so completely filled with rocks as to be impassable for boats, which can, however, land on the north side of the island.

The whole group forming the island of Anacapa is composed of coarse, dark grey sandstone, very rotten and crumbling. The sides are perpendicular, and from 250 to 800 feet high. The main peak is marked on the north side by several deep gulches with almost vertical sides, running from the summit to the bluff. The whole formation is filled with innumerable cavities, giving it the appearance of an enormous blackened honeycomb. At the eastern

extremity is found a very beautiful arch in one of the outlying rocks. The soil is loose and thin, and not a drop of water is to be found on the islands.

The depth immediately off the cliffs of Anacapa is generally from 5 to 6 fathoms, which increases to 17 and 25 fathoms at an offing of about a $\frac{1}{2}$ of a mile. Close to the arched rocks are soundings of 9 to 11 fathoms. The depth mid-way between the island and Santa Cruz, is 80 $\frac{1}{2}$ fathoms, grey sand, coral and shells; this prevails with tolerable regularity across the channel, but increases to 85 fathoms at $\frac{1}{2}$ of a mile from Santa Cruz island.

SANTA CRUZ.—This island, the largest of the California islands, lies about 20 miles from the coast and opposite to, or almost due south from, the town of Santa Barbara. It is 21 miles long East and West, and has an average width of 4 miles; its western part is the broadest. From its east end Santa Barbara light bears N.W. $\frac{1}{2}$ N., 24 miles; from Prisoner harbour, this light bears N. by W. $\frac{1}{2}$ W., 22 miles; and from its west end the same light bears N. by E. $\frac{1}{2}$ E., 21 miles.

The island, composed of coarse dark grey sandstone, crumbling and rotten like that of Anacapa, is bold and about 1700 feet in height. Its eastern part is extremely irregular, barren, and destitute of water; and the surface of the north-eastern portion is thickly strewn with large angular pieces of stone, broken as if with a hammer.

On the northern side of the island, and near the middle, the shore makes a moderately deep curve, forming a roadstead named Prisoner harbour, at the opening of a valley, where plenty of wood and water can be obtained. Anchorage may be had at a $\frac{1}{2}$ of a mile from the middle of the beach in 15 fathoms, sandy bottom; but there is no protection from the heavy swell setting in with a north-wester,—it, however, affords excellent refuge from gales from south-eastward. The position of the beach on the eastern side of the little stream of fresh water in this harbour is considered to be lat. 34° 1' 10", long. 119° 40'.

The soundings round the island show deep water close to the shore. There are rocks showing quite plainly at 1 mile from the south-west point of the island.

SANTA ROSA.—This is the middle island of the group off the coast between Santa Barbara and point Concepcion. Its general shape is that of a parallelogram, with the direction of the longer axis almost exactly East and West, and 15 miles in length; and the shorter North and South, giving it a width of 10 miles.

On the north-west side of the island, and mid-way between the north and west points, a reef extends out 1 $\frac{1}{2}$ miles.

There is a good passage between Santa Cruz and Santa Rosa, having a width of 5 miles, and one also between it and San Miguel of 4 miles. Both passages are frequently used by the California and Panama steam ships.

The soundings round the island do not show such deep water as that existing round the others. On the north-west and north-east sides a depth of from 15 to 20 fathoms is found at 2 miles from the shore; on the south-east and south-west sides the water is much deeper.

The outline of the island is bold, but not so high as Santa Cruz. The hills are rolling, and covered with coarse grass and bushes. No harbours exist around its shores, which are steep and broken.

The approximate geographical position of the south point of the island is lat. 38° 58', long. 120° 4'; and of the western point, lat. 38° 58 $\frac{1}{2}$ ', long. 120° 12 $\frac{1}{2}$ '.

SAN MIGUEL.—San Miguel, the westernmost of the California islands, is $7\frac{1}{2}$ miles long in an E. $\frac{1}{2}$ N. and W. $\frac{1}{2}$ S. direction, and has an average breadth of $2\frac{1}{2}$ miles. From its west end point Concepcion bears N. by W. $\frac{1}{2}$ W. distant 25 miles, and point Arguello N.W. by N. $\frac{1}{2}$ N. 85 miles. This end of the island is bold and narrow, gradually increasing in breadth until it attains $8\frac{1}{2}$ miles; as seen from south-westward, it appears to be several hundred feet in height, and composed of sand dunes, therein differing from all the other islands. The eastern face of the island is nearly straight for 2 miles; the southern face is nearly straight along its whole length, with high, abrupt shores.

On the N.E. side of the island is a small bay named Cuyler harbour, off which lies a rock or islet more than a $\frac{1}{2}$ of a mile long, and several hundred feet high. From this islet to the head of the bay the distance is $1\frac{1}{2}$ miles, and the course S.W. Close under the western side of the bay is anchorage in 6 fathoms, secure from every wind except the North, which rarely blows. The eastern part of the bay is full of rocks and reefs, and ought to be avoided. The reef in the middle of the bay bears S.W. from the west end of the islet, distant $\frac{1}{2}$ a mile; it is the same distance from the west point of the bay, near the anchorage, and bears from it E. by S. At about $\frac{1}{2}$ of a mile S.W. by S. $\frac{1}{2}$ S. from the west end of the islet is a rock, and rocky bottom; and on the same line of bearing, but $\frac{1}{2}$ a mile distant, another. The southern part of the islet is about $\frac{1}{2}$ a mile from the east shore of the bay. The bay shores are high, steep, and rolling, and covered with coarse grass and bushes. There is no water here in summer, but during the winter water drains down the gully at the beach in the middle and southern part of the harbour. The south-west part of this harbour is considered to be in lat. $84^{\circ} 8'$, long. $120^{\circ} 20' 27''$.

The sea round San Miguel island is deep, a depth of 22 fathoms prevailing at about a mile from its shores. In mid-channel between it and point Concepcion there is no bottom at 120 fathoms.

Tides.—The corrected establishment of the port at Cuyler harbour is 9h. 25m. The mean rise and fall of tides is 8.7 feet; of spring tides 5.1 feet; and of neap tides 2.8 feet.

Richardson Rocks.—These two rocks showing well above water, lie N.W. by W. from the western extremity of San Miguel; the larger is distant 5 miles, and bears S. $\frac{1}{2}$ E., distant 22 miles, from point Concepcion, and S.S.E., 80 miles from point Arguello. Off the inner or smaller rock a reef extends a short distance southward and westward. Deep water is found around the rocks, and vessels may pass between them.

POINT CONCEPCION TO POINT REYES.

From point Concepcion the coast trends N.W. by W. $\frac{1}{2}$ W. 12 miles to point Arguello. The shore is bold and compact, curving slightly eastward between the two points, and the mountains immediately behind are not less than 8000 feet in height. At 200 or 800 yards off point Arguello are some detached rocks, upon which the steamship *Yankee Blade* struck and was lost on the 1st of October 1854, and 415 persons perished.

At 8 miles northward of point Arguello is a small stream named La Purissima, from the mission La Purissima Concepcion situated a few miles inland; it rises in long. $119^{\circ} 20'$, at about 15 miles from the coast, and runs parallel therewith behind the Sierra Concepcion.

The first point northward of point Arguello is point Purissima, from which a reef extends about a $\frac{1}{2}$ of a mile to the S.S.W.* Between points Purissima and Sal, a distance of $7\frac{1}{2}$ miles, is a small stream named Guayamas.

From point Arguello to point Sal the distance is 19 miles in a N. by W. $\frac{1}{2}$ W. direction. Point Sal is marked by streaks of yellow sand, except at the extreme point; the extremity is formed by high, round, black rocks, off which are several sunken rocks, extending $\frac{1}{2}$ a mile southward and westward. This stretch of the coast is very similar to that behind points Concepcion and Arguello, but, after passing point Sal, the mountains fall back, and the shore is formed of sand hills. The general bend hence is North, until the shore commences sweeping westward to form the bay of San Luis Obispo, and the shores become high and abrupt.

SAN LUIS OBISPO.—At about 17 miles northward of point Sal, and at nearly 86 miles from point Arguello, is the bay of San Luis Obispo which is an open roadstead, exposed to southward and by no means a desirable anchorage, for even during heavy north-west weather a bad swell rolls in, rendering it extremely uncomfortable. The landing is frequently very bad, and often impracticable, but the best place is in the mouth of the creek, keeping the rocks at its mouth on the starboard hand. Fresh water may be obtained from a small stream opening on the beach at $\frac{1}{2}$ a mile westward of the creek.

Off point San Luis, which forms the S.W. part of the bay, are some rocks. When making the anchorage vessels should give this point a berth of $\frac{1}{2}$ a mile, passing in 6 or 8 fathoms; run on a N. by E. course and anchor at $\frac{1}{2}$ of a mile from the shore in 6 fathoms, sticky bottom; soundings of 4 fathoms can be got about a $\frac{1}{2}$ of a mile from the beach. In winter, anchor far enough out to clear point San Luis if a south-easter should come up. During southerly weather a landing is frequently effected at the watering place, when impracticable at the creek.

The distance from the rock off point San Luis to the mouth of the creek is $1\frac{1}{2}$ miles; from the same rock to a white rock the bearing and distance are N. 70° E. $2\frac{1}{2}$ miles;—a black rock lies halfway between the white rock and the mouth of the creek.

The estimated position of the bluff at the east side of the small fresh-water stream westward of the creek in San Luis Obispo bay, is lat. $35^{\circ} 10' 87''$, long. $120^{\circ} 48' 81''$.

Tides.—The corrected establishment of the port at San Luis Obispo bay is 10h. 8m. The mean rise and fall of tides is 3.6 feet; of spring-tides 4.8 feet; and of neap-tides 2.4 feet.

At about 10 miles inland from the bay of San Luis Obispo, is the town of the same name, situated in the middle of an extensive and excellent grazing

* This point is known on the coast as point Pedernales, signifying point of Flints, but now generally and erroneously printed Pedro Nales. Formerly it was called San Pedro Nolasco. Near this point the steam ship *Edith* was lost in 1849. The state survey of California places point Pedernales only 2 miles northward of point Arguello.

country. Communication is maintained between the bay and San Francisco and other ports by steamers and lines of packets.*

From point San Luis the coast trends in a straight line W.N.W., for a distance of 8 miles to point Buchon; close along this shore are several large rocks. Thence the coast trends abruptly northward, running to the high conical rock called El Moro, distant 8 miles—these two shores forming the seaward base of mount Buchon, which rises to a great height and is readily distinguished in coming from the northward or southward.

From El Moro the shore gradually trends westward, and forms a deep indentation known as Estero bay. Behind El Moro are several lagoons or streams, and the high land retreats for some distance, leaving the shore low and sandy, while the north shore is rugged, and guarded by rocks. The N.W. point of the bay named point Los Esteros, bears N.W. $\frac{1}{2}$ N., from the west point of mount Buchon, distant 18 miles; within these points the shore line of the bay recedes about 5 miles.

From point Los Esteros to the western point of the anchorage of San Simeon the coast runs nearly straight N.W. by W., for a distance of 15 miles. The shores are not so bold as those southward or northward of it, and the mountains fall well back, leaving a fine rolling country of no great elevation, and well suited to agriculture.

SAN SIMEON BAY.—This is a small exposed roadstead, situated in lat. $85^{\circ} 88' 24''$, long. $121^{\circ} 10' 22''$ †, in which tolerably good anchorage may be obtained during north-west winds, but it is unsafe with southerly winds. The south-west point of the bay bears N.W. by W. from point Esteros, and is distant 15 miles. The shore of the bay trends between N.N.W. to N., for $\frac{1}{4}$ a mile, and then sweeps away westward about $1\frac{1}{2}$ miles, gradually taking a south-east direction. The land behind the bay is comparatively low and gently rolling, the high hills retiring well inland.

Vessels from northward may run boldly round the S.W. point of the bay, within a few hundred yards of the shore, in 3 or 9 fathoms; they should then bear up northward and anchor anywhere off the sand beach, in 5 fathoms, hard bottom, at a little more than a $\frac{1}{4}$ of a mile from shore. The beach is $\frac{1}{4}$ a mile long, stretching well out, and rendering the landing disagreeable with any swell; but in such cases it is usual to land on the western part of the beach. Eastward of the sand beach the shore is bluff and guarded with rocks. Vessels from southward must make short tacks close in shore, or they will assuredly miss the bay. The only sure marks for it are the Piedras Blancas, subsequently mentioned.

The Coast.—From San Simeon bay the coast trends W. $\frac{1}{4}$ N., 4 miles to the Piedras Blancas, two large white sharp-topped rocks situated a short

* It is stated that there is a sunken rock at about 8 miles S.S.W. from point San Luis, upon which kelp has been found at the depth of 4 fathoms. On the old Spanish charts of this coast, an island appears laid down in that direction, but distant about 8 leagues. One of the Pacific mail steam ships laid to in a south-east gale and thick fog off point Concepcion, and drifting northward came unexpectedly upon a sunken rock, upon which the sea was breaking heavily. The commander supposed the vessel to be then off point Sal, and had so plotted the rock upon his chart; but upon being informed of the alleged existence of a rock off San Luis Obispo, he was satisfied that he had been near it, but unfortunately had no opportunity of determining his position.

This locality demands a thorough examination, as it is in the direct track of the whole California trade from San Francisco.

† The place of observation was on the rise just off the beach, and bearing N. 5° W., from the south-west point of the bay.

distance from the shore, the outer and larger of which is in lat. $35^{\circ} 39'$, long. $121^{\circ} 15'$. They are very conspicuous rocks, and as there are none like them on this part of the coast, they are an excellent mark for the bay of San Simeon. From them, point San Luis bears S.E. $\frac{1}{2}$ E., distant 38 miles; point Los Esteros S.E. by E. $\frac{1}{2}$ E., 18 miles; and point Arguello S.E. $\frac{1}{2}$ S., 72 miles.

From the Piedras Blancas the coast trends N.W. $\frac{1}{2}$ W., a distance of 57 miles, in an almost perfectly straight line. At about 18 miles from these rocks the above-mentioned bearing cuts a bold bluff and rounded point named Punta Gorda, off which, and for 2 or 3 miles along the shore northward, there are many rocks.* Continuing on the same bearing, and at a distance of 49 miles from Piedras Blancas, is point Sur, which extends out nearly $\frac{1}{2}$ a mile. As seen from northward or southward, at a distance of 10 miles, point Sur appears as a high, large, round-topped island; but upon approaching it a low neck of land is seen, connecting it with the main. Its approximate position is, lat. $36^{\circ} 19'$, long. $121^{\circ} 52'$.

The highest peak of the range bordering the coast lies 6 miles in from point Sur, and attains an elevation of 4414 feet.

Still continuing on the same bearing, 57 miles from Piedras Blancas and 7 $\frac{1}{2}$ miles from point Sur, another slightly projecting point is passed, at about 1 mile eastward of the course. Thence the coast trends more eastward, running N.N.W. for 8 miles, to point Cypress, and passing point Carmel, the south point of Carmel bay.

From point Arguello to point Sur the bearing is N. 44° W., and the distance 120 miles. From point Sur to point Reyes the bearing is N. 48° W., and distance 118 miles.

The mountains, which had fallen back behind Los Esteros, gradually approach the shore-line north of San Simeon, and about 10 miles north of Piedras Blancas they come down abruptly to the coast, and run parallel with it to point Carmel, forming the boldest and most compact shore that we have yet passed, and attaining a uniform elevation of nearly 4000 feet. These mountains are known as the Sierra de Santa Lucia. From their abrupt faces may be seen cascades falling from a height of 40 or 50 feet directly into the sea.

CARMEL BAY.—Between points Carmel and Cypress, which are about 8 miles apart, lies the small, rocky and unsafe bay of Carmel. At the southern extremity is a small cove, sufficiently land-locked and protected for small vessels. In the vicinity there is an extensive quarry of granite, and several small coasting vessels are employed for its transportation to San Francisco; but there is so little space that they are compelled to warp in and out by buoys placed at the entrance. Point Cypress, the north point of the bay, is low, and covered with cypress to the water, and is the first wooded point met with in coming from southward. The upper branches of the trees are spread out by the influence of the strong prevailing winds, and present a flat or umbrella-like appearance. The Mission del Carmelo is situated but a short distance from the shores of the bay, and can be seen from the water in certain directions.

* This point is the cape San Martin of Cabrillo. As there is a point under cape Mendocino, more generally known as Punta Gorda, it has been suggested that this point retain the name given to it by Cabrillo.

The Coast.—From point Cypress to point Pinos the general direction of the shore is N. $\frac{1}{2}$ E., and the distance 4 miles. Point Pinos makes out as a low rounding point, bringing the pines, with which it is covered, within a $\frac{1}{4}$ of a mile of the shore, off which the rocks make out a $\frac{1}{4}$ of a mile, and the line of 8 fathoms nearly $\frac{1}{4}$ a mile, when the depth suddenly increases to 10 or 15 fathoms, and at a mile reaches 40 or 45 fathoms. The 8-fathom line follows the shore within a $\frac{1}{4}$ or $\frac{1}{2}$ a mile into Monterey, whilst outside of that line the depth increases as suddenly as off the point. Vessels should always give point Pinos a good berth, as a very heavy swell almost invariably sets upon it. This point is the northern termination of the long and elevated range named Sierra de Santa Lucia, extending southward and forming the bold rocky coastline to San Luis Obispo.

The lighthouse upon point Pinos is 85 feet high, and shows a *fixed* light at 91 feet above the sea, visible 13 miles. Its position is considered to be lat. $86^{\circ} 87' 52''$, long. $121^{\circ} 55'$.

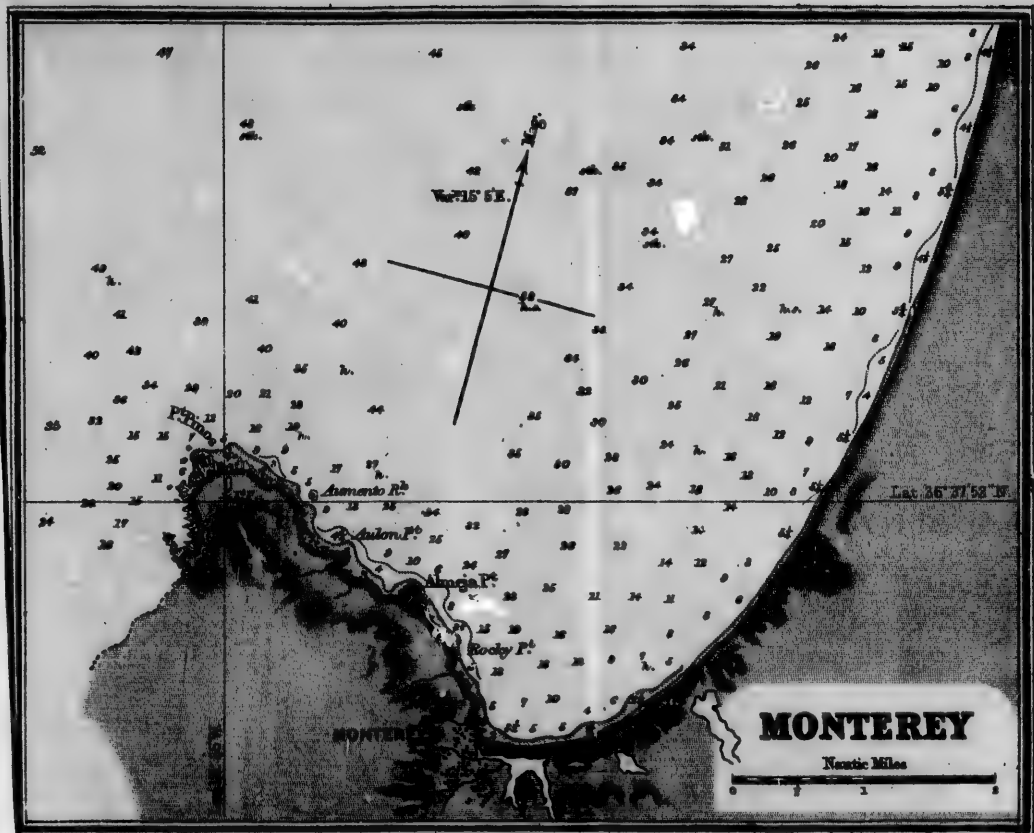
MONTEREY BAY.—Point Pinos forms the south-west point of this bay, and point Santa Cruz (the western point of the anchorage of Santa Cruz) the north-west point. A line joining these two points runs N. 27° W., $19\frac{1}{2}$ miles, and the greatest width of the bay, near the mouth of Salinas river, is $9\frac{1}{2}$ miles.

The only part of Monterey bay in which vessels can anchor in security is near its southern part, off the town, at about 8 miles south-eastward from point Pinos, where is good riding, and tolerable shelter for a few vessels. In order to be protected from the sea, it is necessary to lie at no great distance from the south-west shore, whence, either at night or in the morning, the prevailing wind from the land permits vessels to leave the bay, which otherwise would be a tedious task, by the opposition of the wind along the coast, the general direction of which is between N.W. and N.N.W. To these points of the compass the anchorage is wholly exposed, but as point Pinos to some extent protects it from the swell of the sea, and these winds seldom blow stronger than a moderate gale, the anchorage is tolerably safe and convenient; notwithstanding north-westerly winds are common throughout the greater part of the year, there are few instances known of their being so violent as to affect the safety of vessels tolerably well found in anchors and cables. The soundings are regular, from 80 to 4 fathoms, on a bottom of sand and mud; and, the shores are sufficiently steep for all the purposes of navigation,—without rocks or any known sunken dangers.

From point Pinos to the anchorage off the town of Monterey, the course is E. by S. $\frac{1}{2}$ S. The shore towards the town is rugged, composed of granite, and covered with a heavy growth of fir; but eastward of the town is a long, sandy beach, backed by sand dunes of slight elevation. For a distance of 10 miles along this beach the line of 8 fathoms lies at a distance of 150 yards from the shore, the water deepening rapidly beyond that, and the bottom almost everywhere hard.

Vessels approaching Monterey from *northward*, should follow the coast from point Año Nuevo to point Santa Cruz, then run well into the bay, but not too far, for fear of losing the wind, and to avoid the set of the heavy swell rolling towards the beach. Leaving point Santa Cruz and keeping on a S.E. by E. course about 15 miles, will bring them into 25 fathoms, and nearly 2 miles from the beach; thence a South course for 8 miles will bring them to the anchorage in 10 fathoms, and $\frac{1}{4}$ a mile from the landing. These precautions





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are necessary, because point Pinos, with the whole bay, is almost continually enveloped in a dense fog. Very frequently the coasting steamers have to run for the beach, and then be guided by the route to the anchorage.

A direct course from point Año Nuevo to the anchorage is S.E. $\frac{1}{2}$ E., and the distance 86 $\frac{1}{2}$ miles. From point Pinos to point Año Nuevo the bearing is N. 47° W., and the distance 84 miles.

By anchoring well in at the western side of the anchorage vessels will avoid much of the swell that comes in with the heavy north-west winds, but never sufficient to make any berth there dangerous. In heavy southerly weather point Pinos breaks the swell, but the wind draws very strong over the anchorage. The water shoals from 15 to 8 fathoms in a distance of 800 yards, and the lead should be used to avoid running in too far.

When the California mail steamships stopped at Monterey they frequently ran outside of point Pinos, or in very dangerous proximity to it. This led to their firing a gun when approaching the harbour during foggy or dark weather, and upon the report being heard at the fort a gun was fired in answer, and the exchange kept up until the steamer was safe at her anchorage.

The approximate geographical position of the end of the wharf, abreast of the custom-house at Monterey, is lat. 36° 36' 17", long. 121° 52' 27".

Tides.—The corrected establishment, of the port of Monterey is 10h. 12m. The mean rise and fall of tides is 3·4 feet; of spring tides 4·8 feet; and of neap tides 2·5 feet.

The town of Monterey presents a very pretty appearance as seen from the water. Immediately behind it the country rises in plateaux, diversified by hill and valley, and beautifully dotted by oak groves. It was the capital of California while under the rule of Mexico, and for some years after it became a State.

Regular communication is kept up with all parts of the coast by steamers and numerous sailing vessels. Stages communicate with Santa Cruz and all the towns to San Francisco.

Captain Beechey R.N. (1827) says of Monterey—"The anchorage is in the south angle of the great bay extending between point Año Nuevo and point Pinos. It is necessary to lie close to the shore, both on account of the depth of water, and in order to receive the protection of point Pinos, without which vessels could not remain in the bay. It presents to the eye a very exposed anchorage, but no accidents have ever occurred to any vessel properly found in cables and anchors, in which respect it very much resembles the bay of Valparaiso, nearly in the same parallel in the southern hemisphere.

The town and presidio of Monterey are situated upon a plain between the anchorage and a range of hills covered with woods of pine and oak. At the distance of a league to the southward of the presidio lies the mission of San Carlos, situated in a valley near the river Carmel; a small stream emptying itself into a deep rocky bay. The shores of the bay, and indeed of the whole of the coast near point Pinos, are armed with rocks of granite, upon which the sea breaks furiously; and, as there is no anchorage near them on account of the great depth of water, it is dangerous to approach the coast in light or variable winds. Fortunately some immense beds of sea-weed lie off the coast, and are so impenetrable, that they are said to have saved several vessels which were driven into them by the swell, during calm and foggy weather.

Ships should not enter the bay in light winds in any other part than that used as an anchorage, as there is generally a heavy swell from the westward, and deep water close to the shore.

It is impossible to mistake point Pinos, if the weather be at all clear, as its aspect is very different to that of any part of the bay northward of it. It is a long, sloping, rocky projection, surmounted by pine-trees, from which it takes its name; whereas the coast line of the bay is all sandy beach. There is no danger in approaching point Pinos, except that which may ensue from a heavy swell almost always setting upon the point, and from light winds near the shore, as the water is too deep for anchorage. With a breeze from southward, point Pinos should be passed as closely as possible; a $\frac{1}{2}$ of a mile will not be too near; and that shore should be hugged in order to fetch the anchorage. In case of having to make a tack, take care to avoid a shoal at the south-east angle of the bay, which may be known by a great quantity of sea-weed upon it; there is no other danger. This shoal has $8\frac{1}{2}$ and 4 fathoms upon its outer edge, and 7 fathoms near it. With a fair wind steer boldly towards the sandy beach at the head of the bay, and anchor at about $\frac{1}{2}$ of a mile off shore in 9 fathoms, the fort upon the hill near the beach bearing W.S.W., and moor with the best bower to the E.N.E.

This anchorage, although apparently unsafe, is said to be very secure, and it is also stated that the only danger is from violent gusts of wind from the S.E. The north-westerly winds, though they prevail upon the coast, and send a heavy swell into the bay, do not blow home upon the shore; and when they are at all fresh they occasion a strong off-set in the bay. This I believe is also the case at Callao and at Valparaiso to which, as before mentioned, this anchorage bears a great resemblance.

There is no good water to be had at Monterey, and ships in want of that necessary supply must either proceed to San Francisco, or procure a permit from the governor, and obtain it at Santa Cruz, or some of the missions to the southward. There is very little current at the anchorage."

Monsieur Du Petit Thouars of the French Navy 1837, says of Monterey—"When making the bay, it will be known by a depression in the coast, while the land rises to an elevation of more than 8000 feet at the northern and southern extremities. When in the latitude of point Pinos ($36^{\circ} 39'$), and near the shore, great white spots are seen westward of the point, which render it sufficiently marked. To anchor, with a fair wind, run in to within 2 or 3 cables' length of the rocks seen from this low point, and follow at the same distance the western coast of the bay, until point Pinos is shut in by point Almeja. You are then in 15 or 16 fathoms water, on a bottom of sand and a little mud, with good holding ground; that is the anchorage for large vessels.

Small vessels run in nearer to the bottom of the bay, and anchor very nearly in a range with the battery, in 9 or 10 fathoms water, on a bottom of muddy sand, having point Año Nuevo (the northern extremity of the bay) shut in by point Almeja. On account of the calms, which frequently oblige vessels to anchor, it is necessary to follow the western shore of the bay, neither too far off nor too near. During adverse winds, vessels may safely beat about in the bay of Monterey, as the two coasts are safe, the only danger being in the bottom of the bay, in the south-east anchorage. This is a bank of rock, on which are from 4 to 10 fathoms of water; but it is shown by the kelp which floats on the surface. Fogs are very frequent, and sometimes render it difficult to make the land; and it often happens that it is foggy in the offing but clear near the coast. During the rainy season (from November to March), the wind blows from S.E. to S.W.:—S.E. is the wind of bad weather.

During the dry season (March to November), the winds blow generally from

N.W. to North:—N.W. is the wind for good weather. The N. wind causes a heavy swell in the bay, but it is frequently less severe than in the offing. There is no perceptible current in the bay. Outside it the currents are not strong, and appear to run northward near the coast, and southward more in the offing."

Monterey bay was visited by the French navigator La Perouse in 1786; his remarks are as follows—"In the bay the sea rolls to the foot of the sandy downs which border the coast, and produces a noise which we heard when more than a league distant. The lands north and south of this bay are elevated, and covered with trees. Vessels intending to stop here must follow the southern shore, and when they have doubled point Pinos, which projects to the north, the presidency appears in view, and they come to an anchor in 10 fathoms of water, within and rather near to the point, which shelters them from the winds of the sea. The Spanish vessels which make a long stay at Monterey usually approach as near the shore as the distance only of 1 or 2 cables' length, and moor in 6 fathoms of water, by making fast to an anchor, which they bury in the sand on the beach. They have then nothing to fear from the south winds, which are sometimes strong, but not at all dangerous, as they blow from the coast. We had soundings in every part of the bay, and anchored at the distance of 4 leagues from the shore, in 60 fathoms, soft mud; but as the sea is heavy, it is not possible to remain in this situation longer than a few hours, while waiting for day, or the clearing up of the fog.

Almost incessant fogs envelope the coasts of Monterey bay, which renders the approach somewhat difficult. But for this circumstance there would scarcely be a safer shore. No concealed rock extends further than a cable's length; and if the fog be too thick, it is easy to anchor and wait for its clearing up, when the town is seen in the angle formed by the southern and eastern shores."

The shore of Monterey Bay.—From the town of Monterey northward the shore presents a uniform sand beach running nearly North, backed by low dreary sand dunes, producing sparsely the coarsest grasses and bushes, and entirely destitute of fresh water. This waste extends to Salinas river, of which we reach the great bend at about $9\frac{1}{2}$ miles from Monterey, and only 100 yards from the beach; from point Pinos this bend bears N. 80° E., distant $8\frac{1}{2}$ miles. From this bend the river follows the line of the beach, just inside of the low sand dunes, for a distance of $4\frac{1}{2}$ miles, and then disembogues at a place whence point Pinos bears S. 18° W., and is distant $12\frac{1}{2}$ miles. This river rises in the latitude of the Piedras Blancas; one branch about 20 and the other 88 miles from the coast;—these branches meet at San Miguel, and thence the stream runs parallel with the coast and behind the Sierra Santa Lucia. From its mouth, which is only 60 yards wide at low water, to the entrance of the river Pajaro, the distance is $2\frac{1}{2}$ miles; the shore trending to the N.N.W.; the entrance of that river bears N. 11° E., 14 miles from point Pinos.

From the river Pajaro the coast runs N.W. nearly straight to Aptos creek, a distance of 7 or 8 miles; this creek is about 6 miles E. by N. from Santa Cruz, and the shore between is rocky and abrupt.

North of Salinas river commence rich meadow and table lands, affording spots unsurpassed for productiveness, even in the prolific State of California.

A remarkable sub-marine valley, similar to that off point Hueneme (in lat. $84^{\circ} 10'$) has been discovered in this bay, and to some extent traced out. The head of the valley is $\frac{1}{2}$ of a mile south of the mouth of Salinas river, and

the 20-fathom line is at only a $\frac{1}{4}$ of a mile from the beach, the depth increasing to 50 fathoms in the next $\frac{1}{4}$ of a mile. At this distance from shore the 20-fathom lines are $\frac{1}{2}$ of a mile apart. The general direction of the valley for the next 2 miles is S.W. $\frac{1}{4}$ W. where is a depth of 117 fathoms, and the 50-fathom lines lie about $\frac{1}{2}$ of a mile apart; thence the valley runs about West, reaching a depth of 170 fathoms in a mile, and 240 fathoms in $8\frac{1}{2}$ miles, with 42 fathoms less than a mile to the north of this. The soundings as yet are not numerous enough to trace its outlines in deep water; but the indications are that, for 10 miles of its length, it runs S. 60° W., with no bottom at 815 fathoms. The only available boat landing upon the beach of the bay shores is at the head of this sub-marine valley. There are no indications on the land of this peculiar formation, except that at its head the bay very gradually reaches its greatest easting.

An extensive valley, called the Salinas plains, through which flows Salinas river, extends inland from the eastern part of Monterey bay, nearly to the mission of San Miguel, situated on a plateau of the San Bruno mountains. This valley is said to be nearly 90 miles in length, and in breadth varying from 2 to 10 miles. It contains some 200,000 acres of good agricultural lands, and the remainder affords excellent pasturage for horned stock, horses, and sheep.

SANTA CRUZ.—This harbour or anchorage is at the north-west part of the bay of Monterey, and is of very limited extent. It is protected from all the winds from northward, but exposed to the full sweep of southerly gales, and many coasters have been driven ashore during the winter season. It is about $\frac{1}{4}$ of a mile in depth northward, by $1\frac{1}{4}$ miles East and West.

Vessels coming from *northward*, after leaving point Año Nuevo, follow the coast-line on a general course E.S.E. for about 18 miles. The shore for this distance is abrupt, jagged, and moderately elevated, with a range of high hills or mountains, whose summits in summer are almost continually enveloped in fog. Skirting the shore at a distance of $\frac{1}{4}$ a mile a depth of 6 to 10 fathoms can be carried, and upon making point Santa Cruz, the top of which is moderately level for some distance back, soundings of 4 fathoms are obtained within a $\frac{1}{4}$ of a mile of it;—round up and run along in 5 fathoms until abreast of the beach, where good anchorage will be found at $\frac{1}{4}$ a mile from shore.

Vessels from *southward* in summer keep well into Monterey bay, to escape the full force of the north-westers and the heavy head sea.

During the winter months it is recommended to anchor well out, so as to be able to clear the shore westward of point Santa Cruz in case a south-easter springs up.

Landing on the beach is generally disagreeable, as it extends out some distance, but boats usually land at the embarcadero, at the foot of the bluff in the N.W. part of the harbour.

The beach is over $\frac{1}{4}$ a mile in length, and between its eastern extremity and the bluff point empties the San Lorenzo river, a small stream running past the town and mission, which is situated a mile inland.

The country about Santa Cruz is exceedingly productive, and now thickly settled. A steamer runs regularly in the trade between this place and San Francisco, and numerous coasters find abundant freight from here and the Pajaro country to San Francisco. Regular stage communication is also maintained with San Francisco and Monterey.

The position of the top of the bluff at the embarcadero, is considered to be lat. $86^{\circ} 57' 27''$, long. $122^{\circ} 0' 10''$.

The high mountain, N. 25° E. 12½ miles from Santa Cruz, is named mount Bache, and attains an elevation of 8791 feet.

The corrected establishment of the port is 10h. 18m. The mean rise and fall of tides is 4.1 feet; of spring tides, 5.5 feet; and of neap tides, 2.9 feet.

The Coast.—From point Santa Cruz to point Año Nuevo the distance is 18 miles, and the general direction is W. by N. ½ N., at first curving to the south-westward of that course, and then to the northward, until within 8 miles of the rock of point Año Nuevo, when the shore curves well to westward, (for the last mile to the southwest,) and forms an anchorage protected somewhat against the heavy swell from the north-west, in which is a depth of 5 fathoms within less than ¼ a mile of the shore, and from 10 to 15 fathoms at the distance of a mile.

At a ¼ of a mile from the point lies a black jagged islet, consisting of a sloping ledge of rocks covered with a stratum of yellow clay about 4 feet thick, and this again covered with a mound of sand about 80 feet high. The point itself is composed of rolling hills of shifting sand, varying from 20 to 100 feet in height, while behind them rises the Santa Cruz range of mountains.

Steamers coming upon the coast from southward in thick weather, always endeavour to make the land near point Año Nuevo, and then follow the coast to San Francisco bar.

From point Año Nuevo the coast runs N.W. ½ N., for about 10 miles, to the rocky point named Bolsa. The high mountain eastward from point Bolsa, bearing N. 58° E., and distant 18 miles, named Black mountain, attains an elevation of 2809 feet. Two miles north of Bolsa point is the mouth of the Pescador, a small stream running through a valley of inconsiderable extent. For the foregoing 12 miles the general formation of the immediate seaboard is that of a table land of three terraces, the lowest gradually sloping from the base of the second to the coast, which is exceedingly rocky and forbidding; the underlying stratum is sandstone.

From point Año Nuevo to Pillar point, forming the south and western point of Half-moon bay, the general direction is N.W. by N. ½ N., and the distance 25 miles. At 8½ miles above the Pescador is the San Gregorio, another small stream, and 2½ miles still further is the Tunitas. The seaboard between the valley of the Pescador and that of the San Gregorio undergoes a striking change both in the character of its topography and its geology. Instead of the table land we meet with a spur of the coast mountains running into the sea, and having an elevation of 800 feet within a mile of it. The shore-line and the coast generally presents a very broken and rugged appearance, occasioned by the deep gulches cut through to the ocean.

HALF-MOON BAY.—This anchorage is 6 miles S.S.E. from point San Pedro, and 18 miles S. by E. from the Golden gate. The south-western point of the bay is formed by a bluff table land about 160 feet in height, called the Corral de Tierra, 825 yards south of which stretches a number of black rocks, which show as one when seen coming up the coast, but as three or four when approached from north-westward; the largest is nearly as high as the bluff, and locality known as Sail rock, or Pillar rock. The point is known as Pillar point, and from its south-eastern extremity rocky and foul-bottom, marked by kelp, extends S.E. ¼ E., ⅔ of a mile, dropping suddenly from 14 feet to 5 fathoms; this is the inner reef, and makes the bay available as a summer anchorage. At 1½ miles south-east from the same part of the point a narrow ledge of rocky bottom, ¼ of a mile long, and marked

by kelp, stretches in the same general direction. The passage between this outer and the inner reef is $\frac{1}{2}$ of a mile wide, with rocky and uneven bottom, from $8\frac{1}{2}$ to $10\frac{1}{2}$ fathoms. These ledges lie parallel with the coast mountains, and with the shore-line from which the outer one is distant $1\frac{1}{2}$ miles. From the eastern extremity of the point the shore runs N.W. by N. for $\frac{1}{2}$ of a mile; then N.E. for $\frac{1}{2}$ of a mile, curving to the eastward and south-eastward in a long bend, for $2\frac{1}{2}$ miles to the mouth of the Arroyo de los Pillarcitos, down which comes the only road crossing the peninsula of San Francisco, between the Laguna de Mercedes and Santa Cruz. The highest part of this road, which crosses a depression of the peninsula, is near the Coast Survey station "Ridge," which is 1098 feet above the ocean, and but a few feet higher than the road. The outer reef is nearly abreast of the Pillarcitos, from which the coast runs South 4 miles to Miramontes point, which is S. 48° E., 5 miles from Pillar point; thence to the mouth of the Tunitas the distance is 4 miles S.E. The greatest extent of the bay may be said to be between Pillar and Miramontes points, but the part near the former only is available.

The soundings between the rocky ledges and the shore are quite regular, decreasing from 9 fathoms to 3 fathoms at less than $\frac{1}{2}$ of a mile from the beach, with sandy bottom. The passage to the anchorage is between the inner and outer reef, with the high, bare-topped mountain bearing a little north of East, and Pillar point open to the westward. This mountain is steep, with straggling redwoods on its flanks, and the summit bare. It is locally known as Bald Pate; but, on the Spanish grants, as Cumbra de las Auras. When inside the reefs beat up until Pillar point bears about S.W., distant $\frac{1}{2}$ a mile, and anchor in $4\frac{1}{2}$ fathoms, hard sand. With southerly light winds a heavy swell sets in; but upon the approach of heavy south-east weather it is necessary to go to sea.

The mass of redwoods cresting the mountains of the peninsula cease abruptly abreast of Miramontes, and only stragglers are seen to the northward. They are a good mark for recognizing this part of the coast when coming in from sea.

Around Half-moon bay is a limited extent of agricultural country at the seaward base of the mountains, and small coasters carry the produce to San Francisco.

About 1 mile along the coast to the north-westward is a small boat harbour, 100 yards wide, formed and protected by outlying rocks, and having $8\frac{1}{2}$ fathoms in it. In the autumn months it is used as a whaling station.

Point San Pedro lies N.W. by N. $\frac{1}{2}$ N., 80 miles from point Año Nuevo, and S. 12° E. from point Lobos, at the entrance to the Golden gate. It is a black, bold, rocky promontory, over 500 feet high, having a high, large, jagged rock at the northern part, and is a prominent and excellent mark for making the entrance to San Francisco. The principal rock is nearly 100 feet high; its south face is white, and shows the line of stratification plainly;—it is connected with the main by some low rocks. Half a mile to the north-east of the point is the valley of San Pedro, from which the point takes its name.

The range of mountains forming the north-eastern shore of Monterey bay, and extending to Santa Cruz and point Año Nuevo, is called Santa Cruz. Thence northward to the Golden Gate, and forming the peninsula of San Francisco, by bounding the bay on the west, the mountains are known as the San Francisco or San Bruno range.

The extent of shore line from point Concepcion to point Bonita is about 286 miles.

BAY OF SAN FRANCISCO.—This bay affords the finest and most commodious harbour on the Pacific coast of the United States. From its discovery it has commanded the admiration of navigators, and, since the wonderful rise of California, has well sustained its reputation. Its geographical position, its size and depth of water, its noble entrance and bold shores, the Sacramento and tributaries, draining the rich agricultural valleys and auriferous slopes of the Sierra Nevada, the magic city upon its shores, and the salubrity of its climate, have conspired to make it emphatically the port of the Pacific.*

GOLDEN GATE.—This is the entrance to the bay, and presents the character of a great cleft or fissure in the sea-coast range of mountains, thereby connecting the bay of San Francisco with the Pacific ocean. On approaching, it is difficult to imagine that a deep channel lies ahead, so clear is the atmosphere, and so well defined the Contra Costa mountains, behind the bay. Both shores are bold, broken into points, and rocky; but the northern is much the bolder, rising almost perpendicularly from the water, attaining an elevation of about 1000 feet but a short distance back, and in 7 miles rising to 2600 feet. On the south side, between the points, are stretches of low beach; the hills are undulating and of moderate elevation, increasing very gradually in altitude to the southward, and reaching a height of 1250 feet in about 6 or 8 miles.

Point Bonita.—The north head of the entrance is formed by this point; a narrow, precipitous, rocky cape, nearly 800 feet high, and stretching from the lighthouse about $\frac{1}{2}$ a mile to the S.E. Behind it the mountains rise rapidly to an elevation of 1500 feet. During the dry season the deposit of sea birds accumulates in such quantities on the ridge outside point Bonita lighthouse, as to make the bluff show white, but the first heavy rain carries it off, and then, throughout the rainy season, the point exhibits its natural colour and appearance. There are no dangers off the point, the line of 8 fathoms rarely extending 800 yards from any portion of it. When the clipper ship *San Francisco* was lost on this head, we are told that she first struck the bluff inside the heads; was carried by the currents around the point, and then cast ashore on the outside. A depth of from 5 to 6 fathoms can be found on every side of the point within $\frac{1}{2}$ of a mile.

The lighthouse on point Bonita is situated nearly $\frac{1}{2}$ a mile from the extremity of the point, and consists of a brick tower painted white, and surmounted by a lantern painted black. From seaward it is seen projected against the dark, high hills behind it, and in clear weather is a very plain object. It shows a *fixed* light at 806 feet above the sea, visible 24 miles. Its position is lat. $37^{\circ} 49' 4''$, long $122^{\circ} 30' 50''$. From this light to that on Fort point the distance is $2\frac{1}{2}$ miles, and the bearing E. $\frac{1}{2}$ N.

Upon point Bonita is a fog-bell; it is in a frame building, open in front, and placed on the bluff just in advance of the lighthouse tower, at an elevation of 270 feet above the level of the sea. The bell weighs 1500 lbs., and during foggy and thick weather is struck six blows, at intervals of 16 seconds each, followed by a pause of 44 seconds.

* See the large plan of the bay of San Francisco on the chart of the coast of California published by Messrs. Imray and Son.

Point Lobos.—The south head of the entrance to San Francisco bay is formed by this point, which is 875 feet high. Upon the round-topped hill behind the point is erected a large frame building for a telegraph station, whence the electric wires run to the city of San Francisco. The first telegraphic message transmitted on the Pacific coast was over these wires. Southward of the head the sand dunes are conspicuous and easily recognised features in approaching the entrance. The strong north-west summer winds, drawing in over the land, raise the white sand from the 8 miles of broad beach, and, carrying it inland over the hill-tops, bury grass, bushes, and scrub oak. The quantity of sand driven in from this beach is enormous, and its accumulation has greatly modified the topography of the peninsula.*

Off the western face of point Lobos lie a number of black jagged rocks about 50 feet high, but all within the 5-fathom line, and close in shore. They are called the Seal rocks, and one of them shows a large arch from particular directions. The outer one bears from point Bonita S.E. by S. $\frac{1}{2}$ S., and is distant $2\frac{1}{2}$ miles. From it the general trend of the shore runs in a line to Fort point for nearly a mile, to a short jutting high point, off which lie the Mile rocks. From this point the shore runs well to the eastward for a mile, gradually trending to the north for $1\frac{1}{2}$ miles to Fort point. In the deepest part of this bend the shore is low, with small hillocks rising from the general surface and slope of the hills, and fronted by a long sand beach.

Two rocks named Mile rocks lie off point Lobos, at a short distance within the limit of the entrance of the Golden gate. They are small, near each other, and have a height of 15 feet above water, with a good depth of water all around and close to them; but the current swirls and eddies about them in such a manner as to render a near approach anything but agreeable or safe with a light wind. The inner and smaller rock is $\frac{1}{2}$ of a mile northward of the small jutting point inside of point Lobos, and very nearly 2 miles S.W. $\frac{1}{2}$ S. from Fort point. Vessels running in on the line of Fort point and Alcatraz island pass less than $\frac{1}{2}$ a mile from the outer and larger rock. The rocks bear almost S.E. from Bonita light, distant $1\frac{1}{2}$ miles.

Fort Point.—This was formerly a bold, narrow, jutting promontory of hard serpentine rock, 107 feet above high water, and surmounted by a small Mexican fortification called fort Blanco. The view from the point was one of the finest in the harbour; but the whole headland has been cut down to within a few feet of high water, and increased in area to form a large fortification, which will be mounted with guns of the largest range and calibre. Upon the hillside rising behind it are houses for the accommodation of the commandant, officers, soldiers, and workmen. Eastward of the point is a long substantial wharf, constructed for receiving stores, ordnance, &c. Several large vessels have been lost on Fort point by venturing too close during light airs and strong irregular currents.

Upon Fort point is a lighthouse which shows a *fixed* light at 52 feet above the sea, visible 12 miles; the angle of visibility seaward is bounded by the extremity of point Bonita bearing W. $\frac{1}{2}$ S., and point Lobos bearing S.W. by S. $\frac{1}{2}$ S. The lighthouse is considered to be in lat. $37^{\circ} 48' 81''$, long. $122^{\circ} 27' 88''$.

A fog bell is stationed on the eastern side of the lighthouse. During foggy or thick weather it is struck by machinery, five blows at intervals of 10 seconds, followed by a pause of 84 seconds. There is also a fog-horn.

* We believe it is intended to erect a lighthouse on point Lobos

SAN FRANCISCO BAR.—The bar off the entrance to the bay of San Francisco has a depth of 5 fathoms at the lowest tides.* Its general form is that of a horse-shoe, commencing 4 miles southward, stretching out gradually to 6 miles abreast of point Lobos; and when nearly up to the parallel of point Bonita, running in shore towards that point and forming the "4-fathom bank," from a distance of 4 miles down to one. The average breadth of the bar within the limits of the 6-fathom curve is about 1 mile. It falls off outside to 10 fathoms in $\frac{1}{2}$ a mile, and deepens gradually inside. The depth over the bar when point Bonita light bears between N.E. by E. $\frac{1}{2}$ E. and N. by W. $\frac{1}{2}$ W. is not less than 5 fathoms.

No vessel should anchor upon the bar if she can possibly avoid it; frequently a heavy swell sets in without wind, and if the current is running strong ebb, it allows little chance of escaping from an uncomfortable berth.

The flood tide makes on the bar about 61 minutes earlier than at San Francisco.

It has been given as a rule for steamers approaching in thick weather that they should run for the bar as nearly as they can estimate, keeping the lead going until they strike 5 fathoms, and run on until the depth is increased, when the armed lead should bring up gray sand with red specks, and they may conclude themselves within the bar. Recently, however, it has been intimated that these peculiarities of bottom exist also outside of the bar.†

The fog sometimes stands like a wall outside of a line from Fort Point across the entrance, while the bay inside is beautifully clear. After the greatest heat of the day is passed this fog creeps in and envelopes land and water.

Four-fathom bank.—A first class can buoy, with red and black horizontal stripes, is placed in 4 fathoms at mean low water near the western and seaward end of the "4-fathom bank," lying off point Bonita. It is on the prolongation of the line from Fort Point light to the extreme point of Bonita, and from it point Bonita light bears E. 18° N., distant $8\frac{1}{2}$ miles; outer telegraph station on point Lobos E. 18° S., distant $5\frac{1}{2}$ miles; and the highest part of the western ridge of Table mountain N. 18° W. There is a spot having but $3\frac{1}{2}$ fathoms upon it outside this buoy, bearing S. 84° W., and distant $\frac{3}{4}$ of a mile.

The shores of the Golden Gate.—On the north side of the Golden Gate the shores are very precipitous, with an occasional short stretch of sand beach at the base of the bluffs, affording a boat landing. Point Diablo is the first point inside Bonita, and bears N.E. by E. $\frac{1}{2}$ E., distant $1\frac{1}{2}$ miles from it; between these the shore is indented about $\frac{3}{4}$ of a mile, affording a boat

* A bell-boat was stationed in 1858 outside the bar in about lat. $37^{\circ} 45' 1''$, long. $122^{\circ} 38' 1''$. It was not at its station in November 1860, but may perhaps have been reinstated since. From it South Farallon lighthouse, bore S.W. by W. $\frac{1}{2}$ W., $16\frac{1}{2}$ miles; Point Reyes, (lighthouse site,) N.W. by W. $\frac{1}{2}$ W., $22\frac{1}{2}$ miles; Duxbury point, N.W. by N. $\frac{1}{2}$ N., $8\frac{1}{2}$ miles; point Bonita lighthouse, N.E. $\frac{1}{2}$ N., $7\frac{1}{2}$ miles; Fort Point lighthouse, N.E. $\frac{1}{2}$ E., $9\frac{1}{2}$ miles; point Lobos telegraph station, N.E. by E. $\frac{1}{2}$ E., $7\frac{1}{2}$ miles; point San Pedro, S.E. $\frac{1}{2}$ E., $11\frac{1}{2}$ miles;—The course to enter the bay from the intersection of these bearings is N.E. $\frac{1}{2}$ E.

† A line of large buoys, properly marked, outside the bar in 10 fathoms is the next best expedient after a large fog-gun. From them the position of the bell-boat (supposing it to be at its station, already noticed) could be known; and numbered buoys from it across the bar would enable steamers in thick weather to feel their way in, and be independent of guessing about the velocity and direction of the current.

landing during smooth weather for the lighthouse people. In the vicinity of Diablo the faces of the cliffs show of a reddish purple colour. The rock is very hard and flinty, "traversed by seams of quartz, and has a banded or belted structure, so that it resembles varieties of jasper. * * * * * It exhibits its stratified character most distinctly. It is also found at the cinnabar mine of New Almaden."

The red specks found on the bar are doubtless derived from the disintegration of these reddish cliffs.

From point Diablo the shore is jagged and irregular to Lime Point bluff, 495 feet high, distant 1 mile, and bearing N.E. $\frac{3}{4}$ E. Off this point are several high rocks, but they are so close to the bluff as to be distinguishable only from certain directions. From Lime Point bluff to Fort point the distance is barely a mile, and the bearing S. by E. $\frac{3}{4}$ E. This is the narrowest part of the Golden Gate. Thence the bay begins to open well to the north-east.

On the south side, eastward from Fort point, the shore is low, flat, and marshy to point San José, distant $2\frac{1}{2}$ miles, and bearing E. by N. This point is moderately high, with a few houses clustering upon it, and is locally known as Black point. Off this reach was the 'outer anchorage' of former navigators, and the Presidio of San Francisco is seen a short distance behind it.*

From point San José to North point, at the base of Telegraph hill, the distance is 1 mile, and the bearing E. $\frac{3}{4}$ N. All this space forms part of the city of San Francisco, and is covered with houses. The shore-line is denominated the North beach, and from about the middle of the lowest part projects a long wharf over the flats to 8 fathoms water. This has naturally caused a great deposit around it, and now only $4\frac{1}{2}$ feet of water can be obtained at the north-west part of the wharf at mean low water.

Telegraph hill rises to a height of 801 feet above the mean level of the bay, and is covered with houses to its summit wherever building room can be obtained. The present plan of the city grades contemplates the entire removal of this hill. The position of the hill is considered to be lat. $37^{\circ} 48'$, long. $122^{\circ} 28' 19''$.

Upon this hill was formerly erected a telegraph or semaphore, by which intelligence of the arrival of vessels off the Golden Gate was made known to the city—hence the name of the hill.

Alcatraz Island.—This, the first island that is opened in entering the Golden Gate, is nearly 600 yards long, in a W.N.W. direction, by about 260 in width, and rises to an elevation of 185 feet above high water. The

* "It is a curious and interesting fact that the sand beach between Fort point and point San José has been thrown up by the surf upon an extensive alluvial deposit, which has the character of a peat bog or swamp. When the tide is very low the edge of this peat formation may be seen. Large masses of the peat are also broken out during storms, and thrown up on the sand of the beach. This sand and all the loose round boulders, from 8 to 8 inches, or more, in diameter, rest upon a foundation of the peat; and the continuation of the peat is found in the swamp or flat meadow land which lies inside the belt of sand, and between it and the base of the sandstone hills. It is very difficult to account for the formation of this swamp under conditions like those at present existing.

A strong current is constantly setting backward and forward through the channel, and the action of the surf constantly undermines and encroaches upon the beach, so that the present action is destructive, and the swamp could not possibly have been formed while the Golden Gate was open as we now find it." *Geological Report of the coast of California*, by W. P. Blake, Esq.

summit is flat, falling away gently on all sides for some distance, and then at the sides dropping perpendicularly. Upon the top exists a thin layer of earth, but the island is composed of a fine-grained and very "compact sandstone of a dark bluish green colour. It is regularly stratified in beds of varying thickness, and often separated by thin layers of argillaceous shale. It appears to contain a large amount of protoxide of iron, which changes to the hydrous sesquioxide on exposure." Deep water marks exist all round the island, and, with the exception of one or two places, the sides are so steep that a landing is effected with difficulty. Extensive fortifications are now in course of construction upon it. At the S.E. side a small pier has been built to receive stores, ordnance, and materials. Off the N.W. part, foul bottom makes out about 800 or 400 yards.

The lighthouse on the summit of the island, bears N.W. from Telegraph hill, distant $1\frac{1}{2}$ miles; and from Fort point N.E. $\frac{3}{4}$ E., distant $2\frac{1}{2}$ miles. It exhibits a fixed light at 166 feet above the sea, visible 14 miles; its position is considered to be lat. $37^{\circ} 49' 27''$, long. $122^{\circ} 24' 19''$.

On the south-eastern extremity of the island, close to the water's edge, is a fog-bell, which is about 80 feet above the water. The bell weighs 1092 lbs., and, during foggy or thick weather, is struck by machinery four blows at intervals of 8 seconds, followed by a pause of 15 seconds.

SHOALS IN THE ENTRANCE.—No hidden dangers have been discovered in the entrance outside of the line from Fort Point to Lime Point bluff, but there are several inside.

Presidio shoal, having $8\frac{1}{2}$ fathoms upon it, lies $1\frac{1}{2}$ miles inside of Fort point, and bears N.E. by E. $\frac{1}{4}$ E. from it, or $\frac{3}{4}$ of a point eastward of the line between the lights on Fort point and Alcatraz island. The shoal is about 700 yards long within the 4-fathom curve, and over $\frac{1}{2}$ a mile long within the 5-fathom curve. It is very narrow, shows sandy bottom, and has deep water all round it. Its general direction is on the above mentioned bearing. From the shoalest part the Presidio flag-staff bears S. $\frac{1}{4}$ E.

Anita rock shows above water at low tides, and is situated $1\frac{1}{2}$ miles inside of Fort point, and bears E. by N. from it. It is only 800 yards from the low beach, and has deep water close around it.

A spar buoy, painted red, with even numbers, has been placed in 8-fathoms at about $\frac{1}{4}$ a cable's length due West from the shoalest part of Anita rock. Vessels should not approach this buoy within a cable's length, as a strong current sets across the rock.

Bird or Arch rock is a small pyramidal rock, about 45 feet in diameter, 30 feet high, and bearing W. $\frac{1}{4}$ S., distant $\frac{3}{4}$ of a mile from the lighthouse on Alcatraz island. When seen in the direction from or towards the Presidio shoal, it presents a perforation at low tides.

Shag rock is a low white-topped rock, about $\frac{1}{4}$ a mile nearly N.N.E. from Bird rock. From Alcatraz light it bears W. by N., distant 1 mile. For about 300 yards towards Alcatraz island the bottom is foul and irregular, but outside that limit 10 fathoms are found. The rock shows about 4 feet above the highest tides, being then not more than 8 or 10 feet in extent.

Blossom rock, a ledge having 5 feet water upon it at the lowest tides, and, within the 8-fathom curve, is about 300 by 200 yards in extent, with deep water outside these limits. A spar buoy, painted with red and black horizontal stripes, has been placed in 4 fathoms water, at about $\frac{1}{4}$ a cable's length due South from the shoalest part of the ledge. Vessels should not approach this buoy from any direction nearer than a cable's length.

This ledge bears E. by S. from Alcatraz light, and $1\frac{1}{2}$ miles distant, being almost on the line joining the south points of Alcatraz and Yerba Buena islands. From the summit of Telegraph hill it bears N. 6° W., distant 1 mile.

YERBA BUENA is the large high island opened to the east and south of Alcatraz after entering the Golden Gate. The western point of this island is $1\frac{1}{2}$ miles from Telegraph hill, and the bearing N.E. by E. Its peak is 848 feet high; the sides steep and irregular, and rising to a ridge running nearly east and west. On the western or San Francisco side the water is very deep close in shore, but from the N.W. point a 8-fathom bank extends $1\frac{1}{2}$ miles N.W. by N., spreading to the eastward for $\frac{1}{2}$ a mile, and thence running to the N.E. point.

ANGEL ISLAND.—When passing through the narrowest part of the Golden Gate this large island bears about N.N.E., and is seen as an island for a very short time when in the narrowest part of the Golden Gate. It has an irregular and bold shore-line of about 5 miles, and an area of 1 square mile. It rises to a height of 771 feet, is covered with grass and bushes, and cut in every direction by deep gulleys. As seen from the south-eastward it appears part of the northern peninsula, but is divided from that on its N.W. face by Raccoon straits, $\frac{1}{2}$ of a mile in width, having a depth of water ranging from 10 to 80 fathoms, and a very strong current. A narrow high jutting point makes out from the S.E. portion of the island, bearing N $\frac{1}{2}$ W. from Alcatraz island light, and distant $1\frac{1}{2}$ miles. From this head the general trend of the southern face for over a mile is W. by S. toward Saucelito point.

Point Cavallos is $\frac{1}{2}$ a mile N.N.W. from Lime Point bluff. The shore-line between them falls slightly back, and a very small valley makes down from the high hills behind.

Point Saucelito.—From point Cavallos the general trend of the shore is N.W. by N. for $1\frac{1}{2}$ miles to point Saucelito, with nearly a straight shore-line. One mile from point Cavallos is the anchorage of Saucelito, where men-of-war and whalers formerly anchored. It lies abreast of a few houses forming the town of Saucelito, whence much of the water used in San Francisco was formerly taken in steam water-boats. North of this anchorage is a large bay, with but a few feet of water. From Saucelito point to the western point of Angel island the distance is $1\frac{1}{2}$ miles, and the bearing N.E. by E. $\frac{1}{2}$ E. To Peninsula point, forming the south-western part of Raccoon strait, the distance is 1 mile, and the bearing N.E. $\frac{1}{2}$ E.

DIRECTIONS.—When approaching the coast every opportunity should be seized for determining the vessel's position, as fogs and thick weather prevail near the land. Vessels coming from southward make the coast about point Año Nuevo, (lat. $37^{\circ} 7'$), and follow it at a distance of 4 or 5 miles up to the bar. Steamers keep close under the land for fear of losing it in foggy weather. Coming from westward they first sight the South Farallon island (lat. $37^{\circ} 42'$), and keep upon either side of it; but it is preferable to go southward of it, especially in thick weather and at night, as the vicinity of the island has not yet been surveyed in detail (1862). From the South Farallon lighthouse the point Bonita light bears N.E. by E. $28\frac{1}{2}$ miles. Coming from north-westward they make point Reyes, 597 feet high, in lat. $38^{\circ} 0'$, long. $122^{\circ} 0'$, and pass within 2 or 3 miles of it, 15 fathoms being found within a $\frac{1}{2}$ of a mile from it, but vessels are apt to lose the wind by getting too close under it. From the western extremity of this point the point Bonita light

bears E. $\frac{1}{2}$ S., distant $25\frac{1}{2}$ miles, the line passing over the tail of Duxbury reef, at a distance of $17\frac{1}{2}$ miles from point Reyes.

The bell-boat, (1858) $1\frac{1}{2}$ miles outside of the bar, is placed on the prolongation of the range from Alcatraz island to Fort point, giving a course N.E. $\frac{1}{2}$ E. for vessels entering the Golden Gate, and designated by Belcher the "fair-way line," and he calls the island and fort the "fair-way marks." But with a heavy swell on the bar this range should be used merely as a line of reference, because on the bar it passes over a small 5-fathom spot, while $\frac{1}{2}$ a fathom more can be obtained for a distance of 2 miles both north and south of it. In clear weather and with a favourable wind a vessel can cross the bar in not less than 5 fathoms from the line, having the north end of Alcatraz island just open by point Bonita (N.E. by E. $\frac{1}{2}$ E.), round to the shore south of point Lobos (N. by W. $\frac{1}{2}$ W). Northward of the former line the 4-fathom bank (having $8\frac{1}{2}$ fathoms on it) commences 1 mile west of Bonita, and stretches out over 8 miles, with a breadth of 1 mile.

Between the eastern extremity of the "4-fathom bank" and the shore, the distance is $\frac{3}{4}$ of a mile, and within this space can be found the deepest water for entering the harbour, but it would be dangerous for a sailing vessel to attempt it with a flood tide and light winds. While it is breaking on the bank only a heavy swell is found through this $8\frac{1}{2}$ -fathom channel, and small sail-boats have passed in safety when they dared not try the bar. Close in under the cliffs, at 2 or 3 miles above Bonita, is anchorage in 8 fathoms, with muddy bottom.

During clear, moderate weather any vessel can cross the bar, within the limits we have mentioned, without running until she has got on the 'fair-way line,' whereby she might lose her slant of wind. Should the wind fail, or be light, and the current adverse, anchor outside the bar in 15 fathoms, mud and fine sand; or, after crossing the bar, in 6 to 10 fathoms, fine gray sand, with red specks in some places. Run in mid-channel between the heads; avoid too close proximity to the northern shore, not only in entering, but in leaving; the high, bold bluffs causing calms and baffling airs, even with a south-easter blowing out. Between Fort point and the opposite shore, take special care not to approach Fort point too close, because the currents set around it irregularly and with great rapidity, and the bottom is uneven and rocky. A depth of 69 fathoms is in the centre of the channel. In the Golden Gate an ebb current has been measured running about 6 miles per hour. As a general rule, the winds increase within the heads, drawing in very strongly abreast of Fort point. When off this point steer for Alcatraz lighthouse until the north point of Telegraph hill bears E. by S., then steer to give it a berth of $\frac{1}{2}$ of a mile, running through among the shipping.

In making the port at night it is customary to run for the bell-boat, and cross the bar with Fort point light on with Alcatraz island light, or better, the latter a little open to the northward. But this practice frequently involves much delay and annoyance when the wind will not permit a vessel to attain this position without a tack. With Bonita light bearing from N. by W. to N.E. by E. a vessel may boldly run on within those limits, and, unless there be a heavy swell, safely cross the 4-fathom bank. Give Bonita a berth of a mile, and when within the heads, and Bonita abeam, gradually open Alcatraz light north of Fort point, until abeam of the latter; then run for Alcatraz until the lights of the shipping show the vessel's position. Hauling up for them, anchor off the north beach in 10 fathoms, or off the north-east front of the city in 10 fathoms, soft mud.

In coming upon the coast in thick foggy weather, sailing vessels should not run into less than 50 fathoms because the water around the South Farallon, and off points San Pedro and Reyes, is very bold. It is believed, however, that a 80-fathom bank exists at a considerable distance westward of the latter. South-west of the line passing through the Farallones and Noonday rock, the 100-fathom curve is only 4 miles distant, and the 50-fathom curve only 2 miles, with a very irregular bottom. If the Farallones be made, a course can be easily laid for the bar, but it would be unadvisable to run into less than 10 fathoms, soft mud, if the bell-boat be not heard, as the set and strength of the currents off the bay are yet undetermined. Belcher says that, being caught in a fog, he anchored in 15 fathoms, to the southward of the bar, and determined "that southerly of the fair-way line the ebb tide set N.N.E., flood S.S.W." We suppose he means from the N.N.E., and from the S.S.W. During the season of freshets in the Sacramento and tributaries the discoloured water outside the bar will frequently point out the position of the entrance.

Steamers in thick weather were accustomed to run close along the coast, and endeavoured to make the land north of point San Pedro, running in until they got about 15 fathoms, and then laying a course for the bar, shoaling upon it to about 5 fathoms, and then gradually deepening, while the fog-gun gave the direction of Bonita light.

The U.S. sloop-of-war *Vincennes*, during the cruise of the Exploring Expedition, anchored on the bar in a calm, and, when the flood tide made it brought up a swell that broke over her.

In beating out, vessels start on the last quarter of the flood, make the first tack to the northward of the Blossom rock, and weather it on the second; thence they keep between Alcatraz and the south shore, avoiding Bird rock, 1 mile west of the south end of the island, and giving a good berth to Fort point, past which the ebb current will carry them rapidly, (with a strong tendency towards the south shore,) and a couple more tacks carry them clear of the heads. If the vessel be bound northward, and the weather shut in thick, with the wind to the north-west, she makes a tack off shore southward of the Farallones; if the weather be clear short tacks are made off shore until she works up to point Reyes, because the sea to the leeward of that headland is much smoother and the current less; then stands off until a course can be made for her port.

The Winds.—It has been advised to work close along shore to northern ports during the summer north-west winds, and take the chances of land breezes to make latitude, but the attempt will double the length of any voyage. Baffling light airs and calms frequently exist along the coast while vessels several hundred miles off have strong N.W. winds. Moreover, along the coast we know that the current frequently sets 2 miles per hour from the northward, except very close under the shores. In our experience we never yet have met a wind off the land north of San Francisco, and very rarely, indeed, south of it, except in the region of Santa Barbara channel. As a general rule, it may be safely stated that the summer winds follow the line of the coast, nearly, and gradually draw towards and over the land. In winter, with winds from the southward, this is not so marked.

From April to October, inclusive, the prevailing wind is from the north-west, changing to west in valleys opening upon the coast, but in no case so strongly as through the Golden Gate. During the summer the wind sets in strong about 10 A.M., increasing until nearly sunset, when it begins to die away.

During its height it almost regularly brings in a dense fog, which, working its way over the peninsula, meets that already advanced through the Golden Gate, and envelopes San Francisco and the bay by sunset. As a rule, the breeze does not dispel the fog. If a fog exist outside, the wind is sure to bring it in, but the heated earth dissipates it for a time.

From November to March the wind is frequently from the south-east, blowing heavily, working round to the south-west, with a large and broken swell from the S.W., weather thick, rainy, and squally; the wind not unfrequently ending at N.W., with an ugly cross sea. During heavy south-easters the sea breaks upon the San Francisco bar, clean across the entrance, presenting a fearful sight. The sound can be heard at the anchorage in front of the city.

During some winters a hard "norther" will spring up and blow steadily and strongly from one to five days, with a clear blue sky, and cold bracing weather. Winds rarely blow from points between North, round by the east, to South-east.

The further north we advance, the heavier blow the gales in the winter. The north-west winds are not predicted by the barometer, but, those from the south-east, almost invariably; the mercury falling one inch from its usual height of 80 inches. When it begins to rise, the wind may be looked upon as soon to shift round by the west, and to decrease. Only in one instance during our experience has this failed, and that was off the strait of Juan de Fuca.

On the tops of the mountains bordering the coast, light variable and easterly airs are frequently experienced whilst the north-west winds are blowing freshly along the seaboard. Upon Sulphur peak, in latitude $38^{\circ} 46'$, and 26 miles from the coast, we have had fresh breezes from the E.N.E., whilst the usual north-west winds were prevailing off shore. On Ross mountain, only 8 miles from the sea, and rising 2197 feet from the right bank of the Slaviaska river, we found variable airs when strong summer winds were blowing below.

Tides.—The corrected establishment of the port at San Francisco, is 12h. 6m. The mean rise and fall of tides is 8.6 feet; of spring tides 4.8 feet; and of neap tides 2.8 feet.

The Coast.—From point Bonita to Duxbury point, forming the west side of Ballenas bay, the course is W. by N. $\frac{1}{4}$ N., and the distance $9\frac{1}{2}$ miles. The point, sometimes called Ballenas, is a table land about 100 feet high, which stretches along the coast for a mile or more, and gradually rises to a narrow, nearly treeless ridge, 1880 feet high at its greatest elevation, and running in a straight line $25\frac{1}{2}$ miles N.W. $\frac{1}{4}$ W. to Tomales point. The old Californians expressively call it the Cuchilla Grande. Parallel to this ridge on the east, and starting from the west end of the great cross ridge of Table mountain, runs another to the north-westward, and the depression between them, abreast of Duxbury point, forms Ballenas bay, as it does also Tomales bay further up the coast. This depression forms a long narrow valley, well watered and timbered, and in many places cultivated. Two streams running into each bay, have their sources nearer the bay from which each runs.

Duxbury reef makes out $1\frac{1}{2}$ miles S.E. $\frac{1}{4}$ S. from the southern extremity of the point, and stretching towards point Bonita, forms a safe anchorage in northerly weather. From the tail of the reef to the rocky point E.N.E. from it, the distance is 8 miles, and from this line to the greatest bend of the bay the distance is $1\frac{1}{2}$ miles. In this bay the 8-fathom line makes off $\frac{1}{4}$ of a mile from the south-east face of Duxbury point, but approaching the low sand beach east of the narrow entrance to the lagoon. From 4 to 8 fathoms of water, with a regular bottom of sand and mud, are found in the bay, and 6

fathoms quite close to the reef. From Duxbury point to the bluff, at the entrance to the lagoon, the distance is $1\frac{1}{2}$ miles N.E. by N.

The lagoon north of the bay is at the foot of the mountains, and, except small crooked channels, is bare at low tides, and filled with small islets. The south side of this lagoon is bounded by a long, narrow sand spit, stretching so nearly across it as to leave an entrance of but 100 yards wide at the south-west part of it. Only a few small vessels run between this place and San Francisco.

The shore north of Bonita point is bold and high, presenting a marked and peculiar undulating surface at right angles to the sea front.

North of Duxbury point the hard rocky shore continues bold and high, but gradually merges into cliffs, consisting chiefly of yellowish clay and sand resting upon granite, and, as the surface is regularly undulating, with the direction of the alternate ridges and valleys at right angles to the shore, the wearing action of the surf forms a continuous series of round-topped, bright, vertical bluffs, averaging nearly 100 feet high, and presenting a very noticeable feature from the sea.

The mountains in the back ground rise over 2000 feet, and the 'Table mountain' of Beechey attains an elevation of 2604 feet, stretches nearly 2 miles inland at right angles to the coast, and forms a prominent mark from seaward and from the bay of San Francisco. A few large trees are seen along the top of the main ridge running parallel with the coast and behind the valley, connecting Ballenas and Tomales bays.

Table mountain is a very sharp ridge, showing flat-topped only in two directions. From South Farallon lighthouse it bears N.E. $\frac{1}{2}$ N., distant 24 miles. The geographical position of the eastern peak is lat. $37^{\circ} 55' 86''$, long. $122^{\circ} 88' 88''$.

Drake Bay.—From the tail of Duxbury reef to the west end of point Reyes the course is W. $\frac{1}{4}$ N., and distance $17\frac{1}{2}$ miles. To the east end the course is W. by N., distance $14\frac{1}{2}$ miles. From Duxbury the shore is bold and compact, running nearly N.W. by W. for about 10 miles, then curving regularly to the westward, changing to a low shore, until it reaches its greatest latitude at the Estero de Limantour, which bears N. by E. $\frac{1}{4}$ E., from the east end of point Reyes, distant 8 miles; thence the line curves to the southward and south-west, 1 mile west of the point, leaving a long, high, narrow point stretching to the east, and off which the breakers extend $\frac{1}{2}$ a mile. This curving shore-line forms Sir Francis Drake's bay, which affords a large and admirable anchorage in heavy north-west weather; and by anchoring close in under the north side of the point, in 4 or 5 fathoms, hard bottom, good but contracted anchorage is obtained in south-east gales, as the swell rolling in from the S.W. is broken by the reef.

Several esteros or lagoons open into the north side of the bay, but their entrances are very narrow and shoal. The largest is the Estero de Limantour, which stretches to the northward over 8 miles, and one of its numerous arms approaches within a mile of the ocean beach, 5 miles north of point Reyes head. The entrance to this lagoon has 8 feet of water, and is generally marked by breakers on either hand. Coasters can enter with the prevailing north-west wind.

POINT REYES.—This is the most prominent and remarkable headland north of point Concepcion. It is distinctly visible from the entrance to San Francisco bay, and the summit of the ridge presents an irregular jagged outline, with the highest part about one-fourth of its length from the western

extremity. Its southern face is a precipitous wall of hard sienitic granite, rising boldly from the ocean, attaining an elevation of 597 feet in 300 yards, and stretching nearly in a straight line E. by N. and W. by S. for 8 miles. This direction is peculiar on the coast, and would not be expected from a consideration of the trend of the coast mountains and of the Farallones, which are in line N.W. and S.E. On the north side the cape falls away regularly to a low undulating neck of land, cut up by estores making in from Drake bay. When made from southward it is raised as a long, high island; but on approaching it from westward it is projected upon the mountains running north from Table mountain, and its characteristics are not so readily recognized. Its base is very broken and rocky, and bordered by crags and hundreds of rocks, but may be boldly approached, and 8 fathoms, hard bottom, obtained within less than a $\frac{1}{4}$ of a mile. Off the eastern extremity a reef makes out $\frac{1}{4}$ a mile in continuation of the point. Upon this reef it breaks heavily in bad southerly weather, but 9 fathoms can be had close to the breakers. Off the western head a depth of 12 fathoms is found quite near to the rocks.

Vessels bound to San Francisco from northward always make point Reyes, and, when up to it, sight two mountains on the southern peninsula of San Francisco as islands. One of these is Blue mountain, 1100 feet high, and the other, Abbey hill, 1250 feet.*

THE FARALLONES.

SOUTH FARALLON.—The southern and principal one of the six rocky islets known as the Farallones de los Frayles, lies off the Golden Gate at a distance of $28\frac{1}{4}$ miles; the whole group is disposed in a nearly straight line running N.W. from the southern one. This is the largest and highest, extending nearly a mile east and west, attaining an elevation of about 840 feet above the sea, and presenting to the eye a mass of broken, jagged rocks, upon which no vegetation exists, except a few stunted weeds. The rocks are sharp, angular masses, which, becoming detached by the operations of natural causes, roll down upon the more level parts of the islet and cover it with irregular boulders. A more desolate and barren place can hardly be imagined. From the hills about the Golden Gate the South Farallon is plainly visible, rising in regular pyramidal form.

Vessels from westward, running for the Golden Gate, should keep southward of the South Farallon, especially in thick weather and at night. Westward of it a depth of 50 fathoms is obtained at a distance of 3 miles,

* Mr. Davidson of the U.S. Coast Survey observes—"In 1859, while occupying the Coast Survey station on point Reyes hill, 1889 feet in altitude, and $8\frac{1}{4}$ miles N.E. of N., from point Reyes head, we observed a barque, during a perfect calm, having no steerage way, and turning round several times, drift to the northward past point Reyes head, at the rate of 1 mile per hour. She was 2 miles to the westward of the head. On this and subsequent occasions we noticed the discolored water of the Sacramento from San Francisco bay close in shore, and extending to the northward of the head several miles. Different degrees of discoloration, as of successive ebb tides, were plainly marked."

A lighthouse is to be erected on point Reyes, at about a $\frac{1}{4}$ of a mile from its western point.

shoaling to 20 fathoms in $\frac{1}{2}$ miles; whereas, inside of it, the bottom is very regular at 80 fathoms for 10 miles, and then decreases regularly to the bar. On the S.E. side of the island there is said to be good holding-ground in 15 fathoms.

The San Francisco pilot-boats cruise off the island.

Light.—The lighthouse on South Farallon is in lat. $37^{\circ} 41' 49''$, long. $122^{\circ} 59' 5''$. The light *revolves* every minute, is 360 feet above the sea, and can be seen from a distance of 26 miles. From it the North Farallon bears N. 64° W., $6\frac{1}{2}$ miles; western head of point Reyes, N. by W. $\frac{1}{2}$ W., $17\frac{1}{2}$ miles; point Bonita lighthouse, N.E. by E., $28\frac{1}{2}$ miles; and point San Pedro, East, $28\frac{1}{2}$ miles.

MIDDLE FARALLON.—This is a single rock, between 50 and 60 yards in diameter, and rising 20 or 30 feet above the water. It lies N. 56° W., distant $2\frac{1}{2}$ miles from the lighthouse on the South Farallon. Its geographical position is, lat. $37^{\circ} 48' 32''$, long. $128^{\circ} 0' 55''$.

NORTH FARALLONES.—These lie nearly in line with each other and the Middle and South Farallones, and consist of a group of four islets, having a pyramidal appearance as their name denotes, and comprised within a space of little more than $\frac{1}{2}$ a mile square. The northern three are quite high and bold, the highest peak of the middle one attaining an elevation of 166 feet, whilst the southern one of the group is a mere rock of about 35 yards in diameter, and hardly 20 feet above water. Viewed from south-west or north-east, breakers extend across from the largest islet to the next one south-east, and during a heavy ground swell, an observer on Reyes hill has watched it breaking on an isolated sunken rock lying apparently between the northern and largest islet. From certain directions a small pyramidal detached peak shows close to the north side of the northern islet.

The northern islet is in lat. $37^{\circ} 46' 11''$, long. $128^{\circ} 5' 25''$, and has an extent of 160 yards.

It is said that a rock of 4 fathoms upon which the sea breaks in bad weather lies 2 miles southward and eastward from the North Farallones, and that it has helped around it, except when torn away by storms. In good weather the fishermen are reported to fish around it.

Noonday Rock.—This danger lies nearly on the prolongation of the line from the South Farallon, through the North Farallones. It is of very limited extent, and is, doubtless, a sharp isolated point of a small ledge, having from 20 to 30 fathoms immediately around it. It is plainly visible when directly over it, and has $8\frac{1}{2}$ fathoms of water upon it at mean low water; but at the extreme low water of spring tides there will be hardly so much. In very heavy weather and low water the sea breaks upon it, but this indication seldom exists, and must not be depended upon for ascertaining its position. From it point Reyes, (western head) bears N. $18^{\circ} 25' E.$, distant $18\frac{3}{4}$ miles; North Farallon, S. $79^{\circ} 30' E.$, distant $8\frac{1}{10}$ miles; South Farallon lighthouse, S. $69^{\circ} 45' E.$, distant $9\frac{7}{10}$ miles; and point Bonita lighthouse, N. $71^{\circ} 32' E.$, distant $30\frac{3}{4}$ miles.

In the description of the South Farallon, and in the directions for approaching San Francisco, we have heretofore advised vessels approaching the Golden Gate at night and in thick weather to keep southward of the South Farallon light. This advice has now more significance, and should be followed. With point Reyes and the Farallones in sight, vessels bound in and running between them should keep the western head of point Reyes open on a N.N.E. course,

coming nothing to the eastward, until the North and South Farallones are in range, then bear away for the Golden Gate. In that position the rock will bear S.E., distant $2\frac{1}{2}$ miles. Coming from north-westward at night, vessels should not bring the South Farallon light to bear anything east of S.E. by E., which will clear the rock by 2 miles, and the North Farallones by 1 mile.

South-west of the line passing through the Farallones and Noonday rock, the 100-fathom curve is only 4 miles distant, and the 50-fathom curve only 2 miles, with very irregular bottom.

POINT REYES TO CAPE CLASSET.

The Coast.—Northward of point Reyes is a long reach of broad white sand beach, backed by sand dunes, and extending in a N. $\frac{1}{2}$ E. direction about 12 miles, curving to the north-west, and changing to a high precipitous coast running to point Tomales, which bears N. by W. 15 miles from point Reyes. Three-quarters of a mile before reaching the point, a rocky islet 80 feet in height is seen close in shore. Eight miles above point Reyes is the opening to an estero, the north point of which is low and sandy; the wider arm runs 1 mile towards the head of the western branch of the Estero de Limantour, a little more than that distance from it; the other arm runs nearly $1\frac{1}{2}$ miles to the north-westward. The ridge forming Tomales point and the western shore of Tomales bay is the northern extremity of that starting from Duxbury point. About $4\frac{1}{2}$ miles from the point the ridge is 678 feet high, with slightly lower ground a few miles south. It is where the sand dunes strike this ridge that the coast changes its character; thence to the point it is bold and rocky, with breakers about $\frac{1}{2}$ of a mile off the point, and on the prolongation of the ridge, which averages less than $\frac{1}{2}$ of a mile in breadth for the last 4 miles.

The bay of Tomales extends from Tomales point S.E. $\frac{1}{2}$ E. for $12\frac{1}{2}$ miles, with an average width of $\frac{3}{4}$ of a mile. The entrance is narrow, and obstructed by a bar having a depth of 10 feet, between sandy lumps of 7 feet. The bar lies nearly $\frac{1}{4}$ a mile east of the extreme point, and 400 yards from the bluffs. It is exposed to the full force of the north-west swell, and with the least swell from seaward it breaks across the whole entrance. For 2 or 3 miles this bay is contracted, but has a narrow, deep channel close under the western shore. Four miles within the point lies a small island near the middle of the bay; beyond it the depth of water becomes more regular. Its shores are becoming thickly settled, and trade in agricultural products has increased so much that a small steamer has been put upon the route to San Francisco.

Bodega Head.—This point lies N.N.W. 18 miles from point Reyes, and forms the northern point of Bodega bay, Tomales point being the southern. The head is 200 or 300 feet high, with a slightly rounding summit, and continues of nearly the same height for a mile or two northward, where it changes to a broad sand beach with low country near, but high hills in the back ground. The face of the land about here begins to change from its uniform want of trees to hills partially covered. Bodega head is said to bear some resemblance to point Reyes, but the surveyors state that such does not exist, or if it were they were unable to detect it. The highest part of the head is about 265 feet

above the sea. The position of the head (one mile from its south extremity) is, lat. $88^{\circ} 18' 20''$, long. $128^{\circ} 2' 47''$.

BODEGA BAY.—From Tomales point to Bodega head the course is N.W. $\frac{1}{2}$ W., and the distance $4\frac{1}{2}$ miles. The average width of the bay eastward of the above line is $1\frac{1}{2}$ miles, with the shore running nearly a parallel course. It is bordered by numerous rocks, is abrupt, and reaches a height of 594 feet less than a mile inland. The anchorage lies between the head and the mouth of the Estero Americano, (called Avatcha by the Russians,) which lies E. 16° N., $2\frac{1}{2}$ miles from the head. One mile west of the estero a low, narrow sand spit $1\frac{1}{2}$ miles long, and covered with bushes, stretches towards the head, within 100 yards of it, where a passage exists for the waters of the extensive lagoon north of the sand spit, having small and intricate channels, but almost destitute of water at low tides. The anchorage is $\frac{1}{2}$ a mile outside of this passage, and about N. $\frac{1}{2}$ E. of the rocky islet, in 5 or 6 fathoms, hard bottom of coarse sand and small patches of clay. It is protected by the head and the low rocky islet and reef, about $\frac{1}{2}$ of a mile off the south-east face, from the full force of the north-west swell, which generally rolls in disagreeably in the open part of the bay if the weather is heavy. The reef is densely covered with kelp, and the breakers usually indicate its position. Between the islet and the head there is a narrow $4\frac{1}{2}$ -fathom passage opening directly upon the anchorage. In coming from the north-west in summer this channel is available; but in beating out it is too contracted to be safe. During the winter season it is necessary to anchor well out, to be ready to slip and run, as the sea-room is very contracted and the swell heavy. Some vessels have ridden out heavy south-easters, but several have been lost. In beating out, the only danger is the reef off the head.

On account of the general depression of the coast hills behind Bodega bay, to about 500 or 600 feet elevation, and the valley in which the Estero Americano lies being perpendicular to the coast line, the summer winds draw in towards the Petaluma valley with great force. The trunks of the oak trees rise straight for about 10 feet, then bend almost at right angles, without a branch for 10 or 15 feet, and terminate in a clump of branches all dragged out by the force of the wind. Fogs are found drawing in sooner and more frequently than upon any other part of the coast.

The country in the vicinity of the bay is very productive, both in the valleys and upon the hills. The produce is placed in lighters at the "port" or embarcadero, about 1 mile within the lagoon, and carried by the current to the anchorage.

Tides.—The corrected establishment at the port is 11h. 17m. The mean rise and fall of tides is 8.6 feet; of spring tides, 4.7 feet; and of neap tides, 2.7 feet.

Fort Ross.—At about 15 miles from Bodega head, and 82 miles N.W. $\frac{1}{2}$ N. from point Reyes is fort Ross, off which vessels occasionally anchor, but it is by no means a desirable place to ride in as the anchorage is rocky, contracted, and consequently unsafe. The large white buildings of the Russians on the rising ground, and about 100 feet above the sea, are the only marks for making it, and the shore is so steep and guarded by rocks and reefs as to render approach dangerous. No trade is now carried on here. Its geographical position is lat. $88^{\circ} 80'$, long. $122^{\circ} 18'$.

The shore between Bodega head and fort Ross curves slightly to the eastward of the line joining the two places. Sand dunes commence $1\frac{1}{2}$ miles

C.Hoe



The depth of water
in Bay is liable to
and S.W. gales

BODEGA BAY

Nautic Miles



C. Hocico

Lat. 28° 17' 44" N.

Var. 16° 26' E.



The depth of water at the entrance to Bodega Bay is liable to change during heavy S.E. and S.W. gales

Long. 123° 1' 53" W.

TOMALES BAY
[See Plan]

Tomales Bluff

from the small stream beach. At (river) empty an elevation completely across over it. In a few weeks Healdsburg in that district northward to into the Russian heavy redwood to the lagoon the river.

From Ross has been found but never to

Northward with timber way to fort making the bold spur of is a small ex the high wood mostly covered undergrowth. were cut down (redwood).

Two miles cove, where Francisco.

Eight miles point, where

From fort N.W. by W distance, covered ridge of hills

Haven
from fort Ross anchorage under the main, as close in, as recognize the accurately

Northward They are gone

A few miles in the rainy Ross, behind on the north

from the southern point of the head, and extend $2\frac{1}{2}$ miles to the mouth of a small stream called Salmon creek; these dunes are bordered by a broad sand beach. At $9\frac{1}{4}$ miles from Bodega head the Slavianska (known as Russian river) empties into the sea, breaking through the coast hills that here reach an elevation of 2200 feet. During the summer months a dry bar forms completely across the mouth of the river, so that the trail along the coast passes over it. It requires heavy rains to break through it, and forms again after a few weeks of dry weather. During the summer the bed is dry above Healdsburg, 80 miles from the mouth, and can be forded in several places in that distance. Before breaking through the coast hills it comes from the northward through a broad, fertile valley. The arroyos and streams opening into the Russian river near the coast are filled with a very dense growth of heavy redwood; and in 1860 a tram road was being constructed along the coast to the lagoon inside of Bodega head to carry the lumber from the mill on the river.

From Ross mountain, 2198 feet in height, the discoloured water of the river has been frequently observed to work along close in-shore to the northward, but never to the southward. The fishermen experience the same eddy current.

Northward of the Slavianska again commence the high coast hills, covered with timber which gradually approaches the coast, and reaches it about half way to fort Ross. The Russian vessels used this as a distinctive mark for making the anchorage. Where the timber commences to skirt the coast a bold spur of the mountains comes directly upon the sea. At fort Ross there is a small extent of open, cultivated ground, moderately low, but backed by the high wooded country. The coast and coast hills to the northward are mostly covered with dense forests of immense redwood, pine, and a thick undergrowth. At one of the Coast Survey mountain stations over 40 trees were cut down that measured from $5\frac{1}{4}$ feet in diameter (spruce) to $8\frac{1}{2}$ feet (redwood).

Two miles above fort Ross is a small contracted anchorage, called Timber cove, where a great deal of lumber is sawed, and carried by coasters to San Francisco.

Eight miles above fort Ross is another contracted anchorage, under Salt point, where coasters load lumber.

From fort Ross to point Arena the coast is almost straight, running N.W. by W. $\frac{1}{4}$ W., for 37 miles. It is compact and abrupt the whole distance, covered with trees to the water's edge, and backed by an unbroken ridge of hills about 2000 feet high, and wooded to their summits.

Haven Anchorage.—About 24 miles north-westward along the coast from fort Ross and in lat. $38^{\circ} 47' 58''$, long $123^{\circ} 34' 1''$, is a contracted anchorage under high precipitous rocky islets, with a short stretch of beach on the main, affording a boat landing. There is a protection, when anchored close in, against heavy north-west weather; but it would be very difficult to recognize the locality unless the position of a vessel approaching it were accurately determined.

Northward of this anchorage high bold rocks line the coast for 4 or 5 miles. They are generally known as "Fishing rocks."

A few miles south of this anchorage is the mouth of the Walalla river, open in the rainy season, but having a dry bar in summer. It rises south of fort Ross, behind the first range of coast hills. One of the Coast Survey stations on the north side of the river, and 3 or 4 miles from the coast, has an

elevation of 2192 feet, and this may be taken as the general height of this coast range.

Point Arena.—This is the first prominent headland north of point Reyes, from which it bears N.W. $\frac{1}{2}$ W., distant 67 miles. Approached either from northward or southward it presents a long level plateau, stretching out about 2 miles west of the highlands, and terminating in a perpendicular bluff that averages about 200 feet in height, except the extreme north-west part, which is comparatively low, partially covered with sand, and destitute of trees for some distance inland. When seen from southward, with the sun shining upon the face of the bluff, it shows remarkably white for the length of 2 miles. In fact no point upon the coast presents such a bright appearance, or such uniform vertical bluffs, composed of hard rocks, twisted and distorted into many plications. Bold water is found close off the point, outside the kelp, which, stretching along to the southward, shows the set and comparative strength of the current. When observed in October 1857, it was estimated to be running at the rate of not less than 2 miles an hour. In July, 1853, the computed distances between the astronomical stations, compared with the indications of Massey's patent log, showed a current of from 1 to 2 miles, running southward along the coast.*

At about 2 miles southward of point Arena a small contracted valley opens upon the shore, and off it is an anchorage for small vessels, moderately well protected from the north-west swell, but open to the south-west. Several schooners have gone ashore here. A large bed of kelp lies off the anchorage.

At about $1\frac{1}{2}$ miles N. by W. from point Arena are several rocks showing just above water, and upon which the least swell breaks. These were noticed by Vancouver in October 1798. When 1 mile broad off point Arena a high, sharp pinnacle rock shows well out from the shore on the horizon to the southward, with some rocky islets inside, and breakers well out beyond the pinnacle rock, yet northward of it; but their distances from shore are probably not so much as a mile. The approximate geographical position of Point Arena is lat. $38^{\circ} 57'$, long. $123^{\circ} 45'$.

At about 10 miles northward of point Arena is a small stream named Navarro, upon which is a lumber mill. Articles floating from this river are occasionally found on the coast northward of it.

Albion River.—From point Arena the first point to the north-westward is 24 miles distant, on the bearing of N.W. by N. $\frac{1}{2}$ N. After passing point Arena the coast trends eastward of North, and for 6 miles presents a low shore-line with sand beach, changing suddenly to a straight, high bluff shore with a few trees, and backed within $\frac{1}{2}$ a mile by hills of 2000 feet, covered to their sum-

* Point Arena and the coast southward of it are thus described by Vancouver, "Point Arena is a conspicuous mark on the coast, the shores to the north of it taking a N. 10° W. direction. Its northern side is composed of black rugged rocks, on which the sea breaks with great violence; to the south of it the coast trends S. 35° E. Its southern side is composed of low, sandy, or clayey cliffs, remarkably white, though interspersed with streaks of a dull green colour. The country above it rises with a gentle ascent, and is chequered with copses of forest trees and clear ground, which gives it the appearance of being in a high state of cultivation. The land, further south, is high, steep to the sea, and presents a rude and barren aspect. As we approached the shore advancing to the southward, the country became nearly destitute of wood and verdure, at least that part of it in the vicinity of the sea shore, which was nearly straight and compact. The more interior hills, rising behind the coast, were tolerably well wooded."

mits with wood. At 16½ miles from point Arena is the mouth of the Albion river, a very small stream, with the barest apology for a harbour at its mouth. A saw-mill upon this stream induces coasters to obtain freights here, but a great many of those trading have been lost. In 1858 the Coast Surveying steamer *Active* passed in, but broke her anchor on the rocky bottom.

Mendocino Bay.—At 20½ miles from point Arena, and 4 miles northward of Albion river, is a contracted indentation named Mendocino bay, which is available for a few vessels in summer, but dangerous in winter. The northern and southern points are about ¾ of a mile apart, and the eastern shore retreats nearly ¼ a mile. At the southern head are several small rocks, and one large islet surrounded by rocks, off which are heavy breakers. Midway between the heads is a small reef upon which the sea breaks heavily, with very little swell. Deep water is found close around this reef. Off the northern head is very bold water close to it. Into the north-east part of the bay enters the river *Noyon*, or Rio Grande, between 200 and 800 yards wide, with a good channel on the southern side, a broad sand flat on the northern, and a bar at the mouth with but a few feet of water, and upon which the sea always breaks. The eastern shore is bold and rocky. In the south-eastern part is a sand beach, with a reef extending from its centre.

The bay forms so slight an indentation in the coast-line that it is difficult to find without acquaintance with its minutest peculiarities, as there are no prominent marks by which to determine it. The north head is a table bluff about 60 feet high, and destitute of trees to the northward and some distance inshore. The south bluff is likewise destitute of trees, but more irregular in outline than the other. Vessels bound for it in summer work a little to windward; then run boldly in towards the north point, upon which the houses become recognized; keep as close as possible along the shore, gradually decreasing the distance to 100 yards just off the south end of the point in 6 fathoms; run on about 150 yards past the point; head up handsomely, and anchor in 5 or 6 fathoms hard bottom. It is a bad berth in summer, and in winter a vessel must anchor far enough out to be able to slip her cable and go to sea upon the first appearance of a south-easter. Several vessels have been driven ashore here.

An extensive saw-mill is located on the north side of the river, some distance up; formerly (1858) it was on the north head, and a stationary engine was placed near the mouth of the river to draw loaded cars up the inclined plane, whence they were drawn to the mill. The lumber was slid down chutes into large scows, and carried to the anchorage.

The place is now sometimes called Meiggsville; formerly it was Mendocino City. The position of the north head of the bay is lat. 39° 18' 6", long. 123° 47' 26".

From the point just north of Mendocino bay, (the first one made from point Arena), the shore runs nearly straight for 28 miles in a N. by W. ¼ W. direction, being low and bounded by rocks for 12 miles, when the back hills reach the water and present an almost vertical front 2000 feet in height.

From the deepest part of the bight the general trend of the coast to cape Mendocino is N.W. ¼ W., and distance 45 miles; and for the whole of this distance it is particularly bold and forbidding, the range of hills running parallel to the shore and rising directly from it. It has been found impossible to travel along this stretch of seaboard; and the trail turns well into the interior valleys.

Shelter Cove.—From the compact shore just described a plateau, from 60 to 800 feet in height, and destitute of wood, makes square out from the land, just about latitude 40° , for a distance of $\frac{1}{4}$ a mile, and affords on its south side an anchorage from north-west winds. This cove may, perhaps, be regarded as a harbour of refuge for small coasters which have experienced heavy weather off cape Mendocino, and are short of wood and water, both of which may be obtained here from one or two gulches opening upon the sea; from point Arena it bears N.W. by N. $\frac{1}{4}$ N., distant 65 miles.

The whole sea-face of the bluff, just mentioned, is bounded by thousands of rocks above and below water, and vessels coming from northward for shelter must give it a wide berth, rounding it within $\frac{1}{4}$ of a mile. The anchorage is in 5 fathoms, hard bottom, at about $\frac{1}{4}$ of a mile from shore; in this position fresh water comes down a ravine bearing about North, and an Indian village existed in 1858 at the bottom of the wooded ravine, a little further to the eastward. There is always a swell here, and boat landing may not be very easy.

The south-east part of the bluff (place of observation at about 60 feet above the sea) is in lat. $40^{\circ} 1' 14''$, long. $124^{\circ} 8' 8''$.

Point Gorda.—From Shelter Cove the coast trends 17 miles in a N.W. by W. $\frac{1}{4}$ W. direction to point Gorda, which, as its name implies, is a large, bold, rounding point. At $\frac{1}{4}$ a mile from it there is a large rocky islet, and rocks also lie close inshore, north of the point. From point Arena it bears N.W. $\frac{1}{4}$ N., distant 81 miles.

Cape Mendocino.—From point Gorda to cape Mendocino the distance is $12\frac{1}{4}$ miles in a N.N.W. $\frac{1}{4}$ W. direction, hence the cape is 98 miles N.W. $\frac{1}{4}$ N. from point Arena. Here the range of coast hills from southward appears to meet a range coming from eastward, the junction resulting in a mountainous headland of about 3000 feet in height. The cape is the western limit of the north-west trend of this section of the coast, and its geographical position is lat. $40^{\circ} 25'$, long. $124^{\circ} 22'$.

At about 8 miles broad off the cape is a reef, just under water, known as Blunt rocks, or reef, upon which the sea generally breaks. And, at nearly half way between it and the cape, but a little to the southward, is a sunken rock called Fauntleroy rock.*

Southward of, and immediately off the pitch of cape Mendocino, are numerous rocks and rocky islets, the latter being large and high, with a peculiar pyramidal or sugar-loaf appearance. None of them seem to be more than $\frac{1}{4}$ a mile from the shore, which is almost perpendicular and destitute of a beach.

* As Fauntleroy rock has not been thoroughly examined, nor its position accurately determined, more than ordinary care is required when sailing in its neighbourhood.

Steamers have passed dangerously near it, and in 1857 it was distinctly seen almost under the wheel of the steamship *Commodore*. Vessels can, perhaps, pass over it in smooth weather, but with a heavy sea the water must break.

In January, 1860, the steamship *Northerner* struck upon it. The weather was slightly hazy; long, large ground-swell from the north-west, no wind, and low tide. She was bound up the coast, and going over 10 knots per hour. As her bow sunk in the trough of the sea a very slight jar was felt forward, exciting no alarm among the uninitiated. The pumps were immediately sounded, and the ship found to be making water very fast. She headed for Humboldt, but was beached north of cape Fortunas (False Mendocino) and went to pieces in a heavy south-west blow that sprang up.

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The face of the cape is very steep, rocky, and worn. About this the general appearance is rolling, and the surface covered with timber. The pyramidal islets off it are very readily distinguished in approaching from northward or southward.

From cape Mendocino, Trinidad head bears North, distant 89 miles; Redding rock, N. $\frac{1}{2}$ W., 56 miles; Crescent City lighthouse, N. by W., 79 $\frac{1}{2}$ miles; and cape Orford, N. by W. $\frac{1}{2}$ W., 145 miles.

At about 7 miles south of cape Mendocino is a small stream named Mattole. Upon the sides of the hills in lower Mattole, and not above a mile from the Pacific, coal oil springs were discovered in 1861. Along the course of this stream are numerous bottom lands under cultivation.

Cape Fortunas (False Mendocino) lies northward of cape Mendocino, distant 5 or 6 miles, and is another bold spur of mountainous headland, similar and almost as high as that cape. Between the two the shore recedes slightly, is depressed, and forms a beach receiving a small stream called Bear or McDonald creek, which descends through a narrow valley or gulch. Off this cape are several rocky islets presenting the same peculiarities as those off cape Mendocino. There is no beach at the base of the almost perpendicular sea face.

The vicinity of these headlands certainly deserves a detailed hydrographic and topographical survey. It is reported that soundings have been obtained well to westward of the cape; should such prove correct, the fact will be of importance to vessels, especially steamers, bound north or south, when near the coast and enveloped in fog, as it would enable them to judge of their position and change their course.*

Northward of cape Fortunas, the shore changes to a straight, low, sandy beach, with valleys running some distance inland. At 14 miles from cape Mendocino is Eel river, a small barred stream; it is very contracted and crooked, receiving the waters of a great many sloughs near its mouth, and draining a most fertile valley, which is rapidly filling up with settlers.

An extensive business in salmon fisheries is carried on near the mouth of Eel river. The first vessel known to have entered it was a schooner, in the spring of 1850, when searching for Humboldt bay. She thumped over the bar, which is said to have 9 feet of water upon it at high tide. The Indian name for the river is Wee-ot. It rises by two heads in about latitude 39° 30', about 80 miles from the coast, and runs nearly parallel with it. One head of a small branch called the South fork is only 5 miles from the coast, a short distance south of Shelter cove.

HUMBOLDT BAY.—The entrance to this bay lies 21 miles from Sugar Loaf islet off cape Mendocino; and the bar, N. by E., 22 $\frac{1}{2}$ miles from Blunt rocks. The bar is 1 $\frac{1}{2}$ miles from the entrance between the sand points, or 2 miles from the south-west and highest point of Red bluff, which is the second bluff above Eel river. As with all the rivers on this coast, the bar undergoes irregular changes, depending much upon the prevalence, direction, and strength of the wind. Early in 1851 it bore N.W., distant 2 miles from Red bluff, and about $\frac{1}{2}$ a mile from the beach of the north spit. Soundings of 8 $\frac{1}{2}$ fathoms were obtained upon it; there was then a width of 250 yards

* Lieut. Knox, U.S. Navy, is reported to have discovered a reef at about 8 miles N.W. by W., from the rocks off cape Mendocino. We suspect that this is Blunt reef, the distance being probably over estimated.

between the 8-fathom curves, which retained nearly the same width, and continued on a south-east course towards the bluff, but approached closer to the north than to the south spit. When between the two, the depth of water was increased to 11 fathoms, suddenly shoaling to 4 fathoms inside. Vessels kept the north spit within 150 to 250 yards on the port hand for 2 or 3 miles at ebb spring. In the fall of 1852 the bar was reported to have moved to the northward about its entire width, and the ranges for going in, as laid down by the survey of the previous year, were entirely useless. In the winter of 1853-4 the bar changed much, and often suddenly. In the spring of 1854 it was more than its previous width to the southward of its position in 1851, and the depth of water had decreased, until in June of that year, when the United States Survey vessel crossed, it was over $\frac{1}{2}$ a mile in extent, with only 16 feet of water at high tide. A bare spot then showed at the lowest tides, W.N.W. of the end of the south spit. In that year a brig was observed to thump over the north sands, while on the course prescribed by the sailing directions of 1851. In 1857 less than 18 feet at high tide could be found upon it, and its extent was very much increased. Eventually a deep and narrow channel will be cut through. About 1852 a steam-tug was stationed in the bay, and has since rendered the most efficient service in determining the changes of the bar. When vessels are seen approaching the bar a flag is hoisted on Red bluff, and the tug goes out to take them in. If it is breaking so heavily on the bar that she cannot get through it, and it is yet practicable for the vessel to run in, she takes up a position and hoists her flag as a signal for the vessel to steer for her. She is also used in towing out the deeply laden lumber vessels, as the summer winds blow directly in the channel.

From the foregoing remarks it will be seen that it is not prudent to attempt to enter the bay without the assistance of a pilot, or the help of a tug. In 1861 the steamship *Columbia* was detained in the bay 6 days by unusually heavy weather; at the same time a lumber-laden barque was unable to cross the bar for 25 days.

A lighthouse has been erected on the north spit of the bay at $\frac{1}{2}$ of a mile north of the entrance, and about midway between the bay and sea shores. It shows a fixed light at 58 feet above the sea, visible at the distance of about 12 miles. Its position is lat. $40^{\circ} 46' 4''$, long. $124^{\circ} 12' 10''$.*

Tides.—The corrected establishment at the port is 12h. 11m. The mean rise and fall of tides is 4.4 feet; of spring tides, 5.5 feet; and of neap tides, 3.5 feet.

Humboldt bay is situated immediately behind the low sand spits and dunes, and extends 9 miles north and 4 miles south of the entrance; being contracted to less than $\frac{1}{2}$ a mile in width between the south spit and Red bluff, it then expands to nearly 8 miles, and runs $1\frac{1}{2}$ miles to the eastward of Table bluff. The single channel running into this part of the bay divides into two crooked ones, which contain from 1 to 8 fathoms of water; all the rest shows a bare mud flat at low tides. Abreast of the entrance it is nearly a mile in width, with extensive sands bare at low tides, lying midway

* A light on Red bluff, which is nearly 100 feet high, would always serve as a leading range, as the flag-staff and signal placed there are now thus used by the pilots. It would be distinguishable readily at sea, when the present one might be obscured by the mist hanging over the surf on the beach. During the day the white buildings would be a capital mark against the green hills and trees in the background.

between the opposite shores, and running nearly parallel with them. To the northward its average width is $\frac{1}{2}$ a mile for a distance of $8\frac{1}{2}$ miles; it then expands into a large shallow sheet of water, having two or three crooked channels through it, but the greater part is bare at low tides, showing extensive mud flats, bordered by a grassy flat nearly a mile in width. In the channel way close to the north spit, not less than 8 fathoms may be carried, increasing for 3 miles to $6\frac{1}{2}$ fathoms. One mile north of the entrance, and on the eastern side, enters a small stream called Elk river. Two miles north of the entrance, and on the east side, is situated the town of Bucksport, off which a depth of $8\frac{1}{2}$ fathoms is found within 150 yards of the shore. Vessels are got alongside the sawmill wharf here at high tide to load, at low tides they rest upon the muddy bottom. The military station of fort Humboldt is on a reservation on the bluff about 100 feet high, and immediately behind the town. On the same side, and 4 miles north of the entrance, is the town of Eureka, off which is a portion of the channel, having nearly 8 fathoms in it, but no channel reaching it having more than $1\frac{1}{2}$ fathoms. The town was laid out before this latter fact was discovered. Vessels lie at the wharves, resting on the mud at low tide. Abreast of Eureka lie several low marshy islands cut up by sloughs and ponds. The largest, called Indian island, is about a mile long (N.E.) by $\frac{1}{2}$ a mile in width. It is marked by two hillocks, surmounted by clumps of trees, near which were (1854) several wretched Indian huts. The smaller islands lie between this and the eastern shore and parallel with it. Arcata, formerly Uniontown, is situated on the north-east shore of the bay, and can only be reached by boats at high tide. It is the starting point for the Trinity and Klamath mines. From it an extensive wharf stretches far out over the mud flat, which vessels can reach at high tides.

The southern spit from the entrance to Table bluff does not average $\frac{1}{2}$ of a mile in width; is formed of low sand dunes and grassy hillocks, and bordered on the bay side by marsh. At the southern extremity rises Table bluff, which the name well describes, to a height of about 200 feet, its western point nearly reaching the sea beach, and forming a good landmark for making the bay. Five miles east of it the hills commence rising. Abreast of the north end of the south spit rises Red bluff, presenting to the entrance a perpendicular face, composed of sand and gravel coloured by the decomposition of iron ore near its surface, which is 96 feet above high water, and destitute of tree or bush. The bay front of the bluff is about $\frac{1}{2}$ of a mile long, gradually declining to the low, flat land to the north, and also falling away to the south and east. On this bluff the pilots have a flag-staff to range with known points of trees beyond, by which they cross the bar and keep the run of its changes. The low land on the eastern shore above Red bluff averages $\frac{1}{2}$ a mile in width, and runs as far as Eureka, gradually changing to marsh, and bounded by plateaus and hills covered with wood. The north spit averages $\frac{1}{2}$ a mile in width, and its southern extremity is composed of sand dunes and grassy hillocks disposed in a marked manner parallel with the direction of the north-west winds. Two miles from the entrance trees cover the hillocks and run northward 1 mile, when a space of a mile occurs without them. After that they continue along the shore.

We have already mentioned the situations of three of the towns on Humboldt bay. Humboldt, the fourth town, is located on the south side of Red bluff. It had eight or ten houses in 1854, and was going backward; in

1860 it had two houses. Bucksport has a goodly number of houses and one saw-mill, formed by hauling the steamer *Commodore Preble* on the beach, and using her engines for motive power. Eureka has eight saw-mills and a grist-mill, and presents a thriving appearance; one of the saw-mills is formed by the steamboat *Santa Clara*. Arcata has one saw-mill. (1862).

The Indian name of Humboldt bay is Qual-a-waloo.

Mad river.—This stream has its outlet at about a mile north of Humboldt bay. It averages about 100 yards in width, with a bar at its entrance that prevents egress; but the vast amount of timber in the valley must eventually find a passage through a canal to the north-west point of Humboldt bay. A deep slough from the latter is said to approach quite close to Mad river, thus favouring the execution of such a project.

Trinidad Head.—From the bar of Humboldt bay the coast trends 17½ miles in a N. ½ W. direction to Trinidad head, which bears North 89 miles from cape Mendocino. The low sand beach off Humboldt continues past Mad river to within 2 miles of Trinidad bay, when it changes to a bluff, guarded by innumerable rocks. For the entire distance of the low beach a depth of from 10 to 15 fathoms may be found at 1 mile from the shore.

The bay or roadstead of Trinidad on the south-east side of the headland is of very limited extent, but as the water is deep, and all known dangers are visible, it forms a moderately good summer anchorage. The head, forming the western shore of the roadstead, and a prominent mark when seen from close in, is about 875 feet high, and covered with a low, thick undergrowth of scrub bushes; it has very steep sides, and close to its southern base is a depth of 8 fathoms. Off its western face, for nearly ¼ a mile out, lie several high, rocky islets; and there is also one ¼ a mile south of it, having soundings of 8 and 9 fathoms close to it. From the south face eastward to the 8-fathom curve the distance is 1 mile, and the depth of the bight northward of this line is about ½ a mile, with half a dozen rocks lying outside the 3-fathom line, but well above water. In the northern part of the bay there is a sand beach extending about ¼ a mile; thence eastward the shore is very rocky, the bluff being about 800 feet high, and covered with a heavy growth of timber. The town, formerly a place of some promise, fronts on the north-west part of the roadstead, and the boat landing is on the north side of a round knoll making out about 100 yards from the low neck running to the head. A wharf is now built here, at which vessels lie to load lumber. A very considerable quantity of seaweed lies off the shore.

When working into the anchorage beat in boldly past the outermost rock until the rock just off the eastern side of the head is in range with the knoll (having a few trees upon it) between the town and the head, with the south face of the head bearing W. by N., and anchor in 7 fathoms, hard bottom, within ½ of a mile of the rock and head, having the neck visible westward of the knoll, and a sugar-loaf rock beyond the neck showing over it. A swell will generally be found setting in.

Trinidad bay is a dangerous anchorage during winter, and if a vessel is unluckily caught in it, her chances of riding out a south-easter are bad. Several Spanish vessels were wrecked here when it was visited by them, and a number of vessels have been lost within the last 8 years. In February 1851, the barque *Arcadia* was totally lost in a south-east gale, her ground tackle being insufficient to hold her.

From observations made on the neck of land near the town, the geographical position of Trinidad is:—lat. $41^{\circ} 8' 20''$, long. $124^{\circ} 8' 8''$.*

The shore running N.W. by N. from Trinidad head is remarkably broken and rocky, for about 5 miles which induced Vancouver to call its northern extremity Rocky point. At about 1 mile off it are several rocks known as the 'Turtles.'

From Rocky point the shore takes a gentle sweep eastward, making its greatest indentation at the north end of the once famous Gold bluff, in lat. $41^{\circ} 27'$, long. $124^{\circ} 8'$, and then trending westward to Crescent city. Gold bluff has an extent of 10 miles, and is very bold and high.

Between Rocky point and Gihon bluff, which is the first one to the northward, there is a stretch of low sand beach, immediately behind which is an extensive lagoon several miles in length, and from a $\frac{1}{2}$ to 1 mile in width. It lies parallel with the beach, and at some seasons is not connected with the ocean, but at others an opening exists at the northern extremity. The indian name of the lagoon is *Æ-shœ-shô-ran*.

Redding rock.—At 5 miles from Gold bluff, is the rock known as Redding rock, which is situated in lat. $41^{\circ} 21'$, long. $124^{\circ} 10'$. It is a single large rocky islet about 200 feet high, and reported to have deep water all around it, with no outlying dangers; but its vicinity has not been surveyed. Vancouver places it in latitude $41^{\circ} 25'$ on his chart, and 4 miles from shore; but in the narrative states the distance at $\frac{1}{2}$ a league, and that it is $\frac{1}{2}$ a mile in circuit. His track was inside of it. It has been asserted that a reef, commencing at the shore 2 miles above the rock, stretches out towards it.

Klamath River.—The mouth of this river is in lat. $41^{\circ} 38'$, long. $124^{\circ} 5'$. It is, perhaps 200 yards wide, having a long sand spit on the south side running north-west, and parallel with the high hills that form the north shore. South of the entrance for $1\frac{1}{2}$ miles are outlying rocks, and at the north side of the entrance are several others. It is reported that the depth upon the bar is about $2\frac{1}{2}$ fathoms. Upon passing it in 1858, within less than a mile, the sea was breaking across it, and no appearance of a safe channel was presented. Small schooners are occasionally able to enter it; but the mouth was completely closed in the winters of 1851 and 1860, and the bar changes with every change of heavy weather.

At 8 or 4 miles northward of Klamath river is a small sharp indentation at the mouth of a gulch, off which lie one large and several small rocks; but from a distance of $1\frac{1}{2}$ miles the surveyors were unable to determine whether any stream opened here. It has, however, received the name of False Klamath, because it has misled small coasters seeking for the Klamath, although there is no sand point on either side, as exists at the latter. In the

* The town of Trinidad is nearly deserted during winter, but a brisk trade is carried on in summer. The land in this vicinity is very rich, and well adapted to agriculture. The red-wood trees grow around it and attain an enormous size. The stump of one measured by the surveyors was about 20 feet in diameter, and a dozen trees standing in the vicinity averaged over 10 feet. One is affirmed to be standing on the bank of a small stream at the south-east part of the bay, that measures over 90 feet in circumference. The bark of these trees has a thickness of from 8 to 14 inches; they grow perfectly straight, retaining their thickness to a great height, begin to branch at 50 or 100 feet, and frequently attain 250 feet in height. The forests of this timber, when free from undergrowth, present an imposing sight.

The Indian name of Trinidad bay is *Shô-ran*.

State map of California a creek called Ahmen is represented as opening here. The coast hence continues bold for several miles, when the hills begin to recede and the shores present many pleasant slopes, unincumbered with forests and now under cultivation. The shore is low and regularly sweeps to the westward for a couple of miles, forming the roadstead of Crescent city.

CRESCENT CITY BAY.—This, the most dangerous of the roadsteads usually resorted to on the coast, has acquired much importance on account of the town (Crescent city) being the depot for the supplies of miners working the gold diggings on the Klamath, Trinity, and Salmon rivers. It is filled with sunken rocks and reefs, and has a goodly number showing above water. No vessel should think of gaining an anchorage here without a pilot, or perfect knowledge of the hidden dangers. No sunken rocks are known to exist outside of the line of visible ones, except one awash, situated at a little more than $\frac{1}{2}$ a mile S.W. $\frac{1}{2}$ W. from the lighthouse. A depth of 10 fathoms exists all around it, and 7 or 8 fathoms outside of the visible rocks. The usual anchorage is on a line between the lighthouse and the north side of the large islet $\frac{1}{2}$ of a mile east of it, in $8\frac{1}{2}$ fathoms, hard bottom. To reach this position run for the small, round rock bearing S. 55° E. $\frac{1}{4}$ of a mile from the lighthouse; pass it on the east side, giving it a berth of 100 yards; steer N. by W. $\frac{1}{2}$ W. for $\frac{1}{4}$ of a mile, passing 100 yards on the east of Fauntleroy rock, which is covered at three-quarters flood. If this rock be covered, its position is generally marked by a breaker. It is necessary to keep it close aboard, because there is a sharp bayonet rock having only 2 feet of water upon it, and 200 yards to the eastward. Head up for the town and anchor in $8\frac{1}{2}$ fathoms. To enter or leave it at night, as is done by the mail and coasting steamers, requires a perfect local knowledge of the dangers and peculiarities of the land-marks. Coasting steamers, in fine weather, usually anchor close inshore to discharge freight, which is received in lighters.

A wharf has been built out from Battery point, and landing is now easily effected in good weather. In south-easters the breakers wash over it.

This bay was surveyed in 1858, and again in 1859, from which our directions are in part drawn up, but principally from an examination of it in 1857. The following report (1859) shows clearly the dangerous character of the roadstead, and the knowledge required to enter it—"During the progress of the re-survey of Crescent City harbour, we found several new, dangerous rocks; but as they are not in the channels followed by steamers, and do not interfere with the anchorage in use, it does not seem necessary to notice them further in advance of the publication of the chart, as every one trading here knows that vessels drawing over 9 feet should be very cautious in venturing out of the beaten track. The rocks at that place are of a peculiar character, standing isolated like bayonets, with their points just below the surface, and ready to pierce any unlucky craft that may encounter them. After we finished the survey, and a fair way had been selected for a sailing line, we discovered a very sharp rock almost directly in the passage, with its point only 8 feet from the surface, and deep water all around it. This is mentioned to show that, although the greatest care was taken in the survey, the character of the points of rocks is such that it cannot be surprising if new ones be found for several seasons to come."

In summer there is always some swell here, but in winter it rolls in fearfully, and vessels must choose a position to be ready to run to sea at the approach of a south-easter.

Communication is maintained with San Francisco and other ports by mail and coasting steamers, which generally carry as many passengers and as much freight for this place as they carry to the Columbia river.

The town lies N.W. from the anchorage, immediately on the low shore; old drift-logs, in some instances, forming the foundation for wooden houses. In August 1858, there were about 135 houses of all descriptions. In 1860 the population was 558, and the number of houses 176. The lands adjacent are being cultivated; a grist-mill has been built which turns out 75 barrels of flour per day, and a good trail leads to the "diggins" on the Klamath and Illinois rivers. The S.W. point of the bay is elevated about 25 feet and this height continues to the westward.

The lighthouse at Crescent City bay stands on the rocky islet about 800 yards from the point, which is connected to it at low tides by a broken mass of rocks, over which a single foot-bridge is constructed. It shows a *fixed* light varied by a *flash* every $1\frac{1}{4}$ minutes at 80 feet above the sea, visible 14 miles; its geographical position is lat. $41^{\circ} 44' 84''$, long. $124^{\circ} 11' 22''$, and from it cape Mendocino bears S. by E., $79\frac{1}{2}$ miles.

Tides.—The (approximate) corrected establishment of the port at Crescent city is 11h. 44m. The mean rise of tides, 4.7 feet.*

Point Saint George.—From Crescent City light the coast trends W. by N. 2 miles to point St. George, which rises to the height of from 50 to 100 feet, with table-land some distance back. It is bounded by hundreds of rocks, some of which rise perpendicularly 200 feet from the water. Three or four of the largest present a remarkably white appearance, which serves to distinguish this point. The extensive reef in its vicinity may have led to confusion among the old discoverers, by their confounding it with cape Orford.

Dragon Rocks.—The rocks and reef extending W.N.W. from point St. George for a distance of 6 miles are known as the Dragon rocks. The locality has not been surveyed in detail, but a wide passage exists inside the reef, and is invariably used by the mail and coasting steamers, when entering or leaving Crescent City bay. There are ten or twelve outlying rocks, and many sunken ones, with the passage running between them and those close to shore. This passage is about a mile in width, has 10 fathoms in it, and the general course through is nearly N.W. and S.E., but not straight. Among the multitude of rocks on the land side of the passage are three very large and prominent ones about 200 feet high. It has been already stated that several of the largest rocky islets have a well-marked white appearance, occasioned in part by the deposits of sea birds.

* In the interior, along the coast just described, there is a range of very high mountains running in a direction parallel with the shore, the summits of which can be seen in clear weather above the hills which form this iron-bound coast. One of these mountains, named mount Shaste, is always covered with snow, and appears as though composed of large blocks of rock; its conical shape indicates its volcanic character, although no crater is visible. The position of this mountain is about lat. $41^{\circ} 20'$, long. $121^{\circ} 45'$. The party under Captain Wilkes, U.S.N., had a fine opportunity of observing this mountain, when travelling overland in 1841. "It presented a magnificent sight, rising as it does to a lofty height, its steep sides emerging from the mists which envelope its base, and seem to throw it off to an immense distance; its cleft summit gave proof of its former active state as a volcano. The snow lies in patches on the sides and part of the peak of this mountain; but there is a great difference in the position of its snow-line from that of mount Wood, or St. Helen's. Its height is said to be 14,390 feet, but Lieut. Emmons, U.S.N., thinks it not so high."

Pelican Bay.—From point St. George the coast runs straight for 12 miles N. $\frac{1}{2}$ W.; thence W.N.W. for 9 miles, and forms a deep indentation, named Pelican bay. For 8 miles from point St. George the shore is low for some distance back, and fronted by a sand beach to the mouth of a small stream called Smith's river. The entrance to this river was looked for in vain by the surveyors from the deck of the steamer, although scarcely 2 miles off shore, but they were able to form a good estimate as to where it should open by the peculiarities of the northern bank, which was a low perpendicular bluff. Its approximate geographical position is lat. $41^{\circ} 54'$, long. $124^{\circ} 11'.$ *

Chet-ko river.—At 5 miles from the deepest part of Pelican bay, and in lat. $42^{\circ} 1'$, long. $124^{\circ} 15'$, (both approximate), empties the Chet-ko river, a stream which is from 50 to 60 yards wide at its mouth, with banks about 100 feet high, and bounded half a mile in shore by very high hills. It appears deep and sluggish, and in August 1858, was completely closed at the mouth by a gravel beach. The anchorage off it is open and exposed from West to South, with several reefs in and around it. A survey has not yet been made of it.

On the Coast Survey charts of 1858 this stream was marked Illinois river, that being the name applied to it by the miners prospecting from Crescent city, whereas the Illinois is the south branch of Rogues river. Some give the Indian name of this stream Chit-ko.

From point St. George to an arched rock about 40 feet high, in latitude $42^{\circ} 11'$, the course and distance are N.W. by N. 27 miles. The coast between the Chit-ko and the point within a mile of the arch is high, bold, compact, and bordered by vast numbers of rocks, with very deep water close in shore. From this the shore runs nearly N.W. by N. $\frac{1}{2}$ N. for 40 miles to cape Orford, making a long gentle curve of 4 miles to the eastward, and being in general high, abrupt, and rocky.

Rogues River.—Within the long stretch just referred to is found the entrance of Rogues river, in lat. $42^{\circ} 25'$, long. $124^{\circ} 22'$, (both approximate), having a long, low, sandy point on the south side, and a high, steep hill, with two large rocks off its base at the north side. It comes from the interior between high mountains, and it is next to impossible to travel along its course. The stream is very rapid, and, at a short distance within the bar, is reported to have a depth of 4 or 5 fathoms. Just within the entrance and on the north side were large Indian villages in 1858. When passing it in moderate north-west weather the sea was observed to be breaking heavily across the bar, and this is reported to be generally the case. It has not been examined nor surveyed, and the depth of water on the bar is variously reported to be from 10 to 18

* The "Smith river" of recent maps and descriptions is a myth. Half way between Crescent City and the mouth of Smith river there is a small sheet of water called lake Talawa. North of this small stream the coast acquires an elevation of about 100 or 200 feet for a short distance inland, and is bounded by high mountains.

About 3 miles by the shore northward from the deepest part of Pelican bay, the boundary line of California and Oregon, of 42° latitude, strikes the coast near a remarkable high pyramidal mound, rising abruptly from the plateau, which is destitute of timber.

From point St. George, the coast northward is composed of high steep precipices and deep chasms, falling abruptly into the sea. The inland mountains are very lofty, and appear to be tolerably well covered with trees, apparently pines, although there are some spreading trees of considerable magnitude. Some of the mountains are barren. Along the coast are a number of rocky islets.

feet; the former is, doubtless, nearer the truth. Lieutenant McArthur, of the U.S. Coast Survey reports 10 feet on the bar, and that the channel is too narrow for sailing vessels to turn in. In the spring of 1850 the New York pilot-boat *W. G. Hagstaff* entered the river, and we believe was attacked by the Indians, deserted, plundered, and burnt. The next vessel that entered was the schooner *Sam Roberts*, in July of the same year, which got out safely. We know of no other vessels ever having made the attempt.

Near the entrance to Rogues river commences the detached deposits of auriferous sand and gravel, which are found northward along the coast to the Coquille river.*

Rogues River Reef.—At a short distance northward from Rogues river, is the Rogues river reef, the rocky islets composing which are not so large as the Dragon rocks, and run more nearly parallel with the coast line. The southern group of rocks lies W. $\frac{1}{2}$ N., about 4 miles from the north head of the entrance to Rogues river, and stretches northward 3 miles, where a gap occurs between them and another cluster lying $1\frac{1}{2}$ miles from the shore. Off this inner group lie several dangerous sunken rocks, which must be sharply watched from aloft when the sea is not heavy enough to break upon them. As seen from southward, the inside rock of the outer group shows a perpendicular face eastward, and sloping back to the west. The channel through this reef is perhaps a mile wide, but more dangerous than any other on the coast. No hydrographic survey has been made of it, and it is never used by the coasting steamers. In 1853 the Coast Surveying steamer passed through it.

Abreast of the northern part of this reef is a 5 mile stretch of low sand beach, backed by high, rugged, wooded hills, when the shore changes to an abrupt and precipitous face to port Orford. Many rocks closely border the shore, and 5 miles south of port Orford a high rocky islet lies nearly a mile off the base of the hill, about 1000 feet high.

PORT ORFORD.—This is by far the best summer roadstead on the coast between point Reyes and the strait of Juan de Fuca. From the extremity of the S.W. point eastward to the main shore the distance is 2 miles, and from this line the bend of the shore northward has a depth of 1 mile, forming port Orford. The soundings within this space range from 16 fathoms close to Tichenor rock, forming the S.W. point of the bay, to 3 fathoms within a $\frac{1}{4}$ of a mile of the beach on the north-east side; with 5 fathoms at the base of the rocky points on the north-west side towards Tichenor rock. One mile off the shores of the bay the average depth is about 14 fathoms, regularly decreasing in-shore.

The point forming the western part of the bay presents a very rugged, precipitous outline, and attains an elevation of 350 feet. Its surface is covered with excellent soil and with a sparse growth of fir. From this point the shore becomes depressed to about 60 feet at the northern or middle part of the shore

* The name of the river was suggested by the dishonest propensities of the natives in its vicinity. On the maps it is named Toutounis, and the Too-too-tut-na or Klamet. These names, we judge, have arisen from misapprehension, because the Indians hereabouts, when asked a question which they did not understand, answered toó-ta, toó-ta; toó-ta signifying negation, and rendered more emphatic by repetition. Or the name may be derived from what is called the Too-too-tan village, some distance up the river. That existing (1853) on the north head of the mouth of the river is Tar-shoots. Several campaigns have been made against the Rogues river Indians, and they have been found a warlike and troublesome race; but the manner in which they were treated by some of the early settlers was well calculated to rouse them to a war of retaliation.

of the bay, where the town is located. The hills behind are covered with a thick growth of fir and cedar.

The anchorage is usually made with the eastern end bearing North being just open to the east of a high rock on the beach, in 6 fathoms water, hard bottom, having a sharp, high point bearing N.W. by W. a $\frac{1}{2}$ of a mile distant, the beach in front of the town distant a $\frac{1}{2}$ of a mile, and three rocks just in the 8-fathom line E. by N., distant $\frac{1}{2}$ a mile. Steamers anchor a little eastward of this position, and closer to the town, in 4 fathoms. Coasters from the south in summer beat up close in-shore, stretching inside of the outlying islets to avoid the heavy swell outside. Coming from northward they keep just outside of a high rock $\frac{1}{2}$ of a mile off the western head, and round Tichenor rock within $\frac{1}{2}$ a mile. In winter, anchor far enough out to be ready to put to sea when a south-easter comes up. During a protracted gale in December 1851, a terrible sea rolled in, that no vessel could have ridden out. The old steamer *Sea Gull* was driven northward, and lost two weeks in regaining her station, and the mail steamer *Columbia* hardly held her own for many hours the Orford reef.

The usual landing is north of the anchorage, between the rock named Battle rock and the point of rock close on its west side. A road is cut from here up to the town, which consists of but a few houses. Sometimes a landing is made on the rocky beach a $\frac{1}{2}$ of a mile westward of Battle rock, in the bight, where a sloping grassy bluff comes to the water; but this landing is over a rocky bottom. A road is cut up the slope to the site of the military post of port Orford, which is now abandoned.

From Battle rock the shore eastward is skirted by sand beach for $1\frac{1}{2}$ miles to a rough, rocky point named Coal point. About midway in this distance empties a small creek, whose banks are composed of a deposit of auriferous sand and gravel, the same as found in front of the town abreast of Battle rock, and which has yielded as high as \$80 to \$40 per diem to each miner.

Several attempts have been made to open a road from this place to the mines, about 60 or 70 miles eastward, but hitherto without success. Several parties have gone through, but could find no direct available route for pack-animals. Upon the opening of such a road it would become a large depot of supply for the interior. In the neighbourhood of port Orford are found immense quantities of the largest and finest white cedar on the coast, and for some years a saw-mill has been in operation, affording a small supply for the San Francisco market of this lumber, unapproachable in quality by any on the Atlantic coast.

The high mountain about 12 miles east of port Orford is called Pilot knob.

Observations made on the top of the ridge just west of the town, at a height of 262 feet above the sea, and within a few yards of the western edge of the bluff, determined its position to be lat. $42^{\circ} 44' 22''$, long. $124^{\circ} 28' 47''$. From this station Tichenor rock bears S. by W., $\frac{1}{2}$ of a mile distant.

Tides.—The corrected establishment at the port is 11h. 26m. The mean rise and fall of tides is 5.1 feet; of spring tides, 6.8 feet; and of neap tides, 3.7 feet.

Elk River.—From the western extremity of port Orford, cape Orford bears N.W. $\frac{1}{2}$ N., distant 6 miles, the shore line between them curving eastward about a mile. This shore immediately north of port Orford is composed of a very broad loose sand beach, backed by a long uniform sand ridge of 100 feet height, covered with grass, fern, sallal bushes, and a few firs; while

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CAPE ORFORD.—When making this cape from northward or southward it presents a great similarity to point Concepcion, (in lat. 84° 27', long. 220° 204'), appearing first as an island, because the neck connecting it with the main is comparatively low, flat, and destitute of trees, with which the cape is heavily covered to the edge of the cliff. It is, perhaps, over 200 feet high, but the trees upon it make it appear at least 100 feet more. The sides are very steep, and worn away by the action of the sea, showing a dull whitish appearance usually, but bright when the sun is shining upon them. At the base are many black rocks and ledges stretching out to form the inner part of Orford reef. In the bend, south-east of the cape, rises a large, high, single rock, about 100 yards from the beach. The approximate geographical position of the cape is lat. 42° 50', long. 124° 80'; it is consequently the most western part of the main land until we reach latitude 47° 50'.

From this headland cape Mendocino bears S. by E. ½ E., distant 145 miles; cape Hancock light, at the north side of the entrance to the Columbia, N. by W. ½ W., distant 207 miles; and Tatoosh island light, off cape Classet N.N.W., 332 miles. From the line joining capes Orford and Hancock the coast does not, in any place, leave it more than 12 miles,

Orford Reef.—At about 4 miles from the coast, between port and cape Orford, lies a group of rocky islets and sunken rocks, known as Orford reef. There are seven large high rocks within an area of one square mile, with small ones that are just awash, and others upon which the sea only breaks in very heavy weather.

The south-eastern rock named Fin has a perpendicular face to the south-west, with a sloping surface to the north-east; near it are several low black rocks. Fin rock lies W. ½ N., distant 4½ miles from the western point of port Orford, and the general direction of the six others is N.N.W. from this rock. West from port Orford, and distant 4½ miles, is a small black rock, and near it a smaller one, upon which the sea breaks only occasionally. W. by N. ½ N., distant 4½ miles from port Orford, lies the largest of the seven islets, rising up with high and nearly perpendicular sides. On the same course, and 1½ miles further out, is a small rock, and half way between them a rock awash. This is the northern limit of the group.

Stretching S.S.W. for 1½ miles from cape Orford are numerous rocky islets and sunken rocks, with large fields of kelp; but ceasing at that distance, a

* At the mouth of Elk river, a bottle nearly buried in the sand, was picked up on the 18th of May 1860, with a memorandum, stating that it had been thrown from the steamship *Brother Jonathan* in lat. 42° 0', long. 124° 50', on the 23rd of March 1860, the wind at the time strong from the southward. It had travelled nearly North about 50 miles.

passage is left $1\frac{1}{2}$ miles wide between them and the northern islets of the other group. The course through the middle of the passage, clearing the rock called Klooqueh, off the western point of port Orford, is N.W. by W., with 10 fathoms rocky bottom on the shoalest part of that line. This passage is in constant use by mail and coasting steamers, but the hydrography of the reef has not yet been executed, and only a preliminary examination of the position of the outer rocks. Although the general trend of the southern group is N.N.W., it is very probable that they are a continuation of the reef making out from the cape.

One mile north of cape Orford empties the Kowes, a small stream having a great number of rocks off its mouth. In 1851 it was usually called Sikhs river, the Chinook "jargon" name for friend. On some maps we find a stream near this locality called Sequalchin river. The village upon the Sikhs is named Te-chéh-quut.

Ten miles north of cape Orford La Perouse places a cape called Toledo, but no headland exists between Orford and the south head of the Coquille, although a small stream called Flora creek empties upon the coast about half way between them.

General features.—From cape Mendocino the hills upon the seaboard range from 2000 to 8000 feet high, running parallel with the coast at a distance of from 3 to 5 miles, receding somewhat at the Eel river valley and point St. George, and at other points coming abruptly to the ocean. The whole face of the country is covered with dense forests, and offers almost insurmountable obstacles to the opening of roads intended to strike the trail leading along the valleys of the Sacramento and Wallamut.

Northward of cape Orford the appearance and nature of the coast assumes a marked change. Long reaches of low white sand beach occur, with sand dunes, broken by bold rocky headlands, and backed by high irregular ridges of mountains. On the sea-face and southern sides of many of these prominent points no timber grows, and they present a bright, lively green of fern, grass, and bushes. The general altitude of the mountains appears the same as to the southward.

Coquille River.—From cape Orford to the mouth of the Coquille, in lat. $49^{\circ} 7'$, the coast runs exactly North for 17 miles, with a slight curve of $1\frac{1}{2}$ miles eastward, and a short distance north of cape Orford consists of a low sand beach, immediately behind which are long shallow lagoons receiving the water from the mountains, but having no visible outlet to the sea. Along this shore the soundings range from 7 to 15 fathoms at a distance of a mile.

The south point of the entrance to this river is a high bluff headland, whilst the north point is a long, low, narrow spit of sand, overlapping, as it were, the southern head, so that the channel runs parallel with and close under it, (1851.) A short distance off it lie several rocks, but not of sufficient size to lessen the western swell which breaks continually across the bar.

In the winter of 1851 the boats of the *Sea Gull* effected a landing near the rocks, but it was attended with danger; subsequently boats were carried by land from port Orford. The widest part of the mouth is less than 200 yards, after which the river spreads out into a large sheet of shallow water, about 2 miles long by $\frac{3}{4}$ of a mile broad, and bounded by low ground. Into the north-east part of this lagoon enters the river, which has been followed a distance of about 80 miles in a north-easterly direction, and having a depth throughout of not less than 15 feet, and an average width of 40 yards. It

drains a very fertile region, densely covered with many varieties of wood. Numerous Indian encampments were found along its banks from the mouth, and quite extensive fish weirs were discovered and destroyed. About 15 miles from its mouth there is a portage of $1\frac{1}{2}$ miles to Koos river.

The hydrographic reconnaissance of this river in 1859 by the Coast Survey shows only 3 feet of water on the bar, and it is reported inaccessible for vessels of ordinary draught. The north point is a long stretch of dreary sand dunes, and has a single bold rock at its southern extremity. The channel makes out straight from the southern head, and north of the rocks (1859.) The approximate geographical position of its entrance is lat. $48^{\circ} 7'$, long. $124^{\circ} 24'$.

Tides.—The (approximate) corrected establishment is 11h. 30m., and the mean rise and fall of tides 5 feet.*

CAPE ARAGO.—Between the Coquille river and this headland a low sand beach continues for 10 miles to the southern part of cape Arago, which rises up very precipitously; the hill (attaining perhaps 2000 feet elevation 2 miles back) runs in a straight line northward for 3 or 4 miles, and bounded by many rocks, slopes northward to a sharp perpendicular point, about 60 feet high, and peculiarly cut and worn by the action of the sea; thence it takes a sharp turn to the E.N.E. for 2 miles, to the entrance to Koos bay. The cape, as seen from southward, shows a couple of rocks a short distance from its western point. Along the low shore soundings in 10 fathoms are found at a mile off. It has been asserted that vessels anchoring close under the north face of the cape may ride out heavy south-east gales. If so, it is very important, no other place between Drake and Neé-ah bays, except, perhaps, under Destruction island, affording that protection. If a south-easter should haul to the S.W. and then N.W. as they usually do, the chances of getting out would be bad.

Upon a small island at the western extremity of cape Arago is a lighthouse, which shows a *fixed* light varied every 2 minutes by a *flash*, at 75 feet above the sea, visible 15 miles. The duration of flash is 3 seconds, and that of eclipse also 3 seconds. The approximate geographical position of the lighthouse is lat. $48^{\circ} 20' 38''$, long. $124^{\circ} 22' 20''$.

Cape Arago was seen by Captain Cook, and described by him as follows—“This point is rendered remarkable by the land of it rising immediately from the sea to a tolerable height, and that on each side of it is very low.” Vancouver says—“This cape, though not so projecting a point as cape Orford, is nevertheless very conspicuous, especially when viewed from northward, being formed by a round hill on high perpendicular cliffs some of which are white a considerable height from the level of the sea; above these cliffs it is pretty well wooded, and is connected to the mainland by land considerably lower. About a league northward of the pitch of the cape, the rocky cliffs composing it terminate, and a compact white sandy beach commences, which extends along the coast 8 leagues, without forming any visible projecting point or headland. Our observations placed it in lat. $58^{\circ} 28'$.

* Mr. Davidson U.S. Coast Survey, observes “When off the entrance to the Coquille river in 1854 we saw about a dozen houses which had been built by the miners engaged in washing the auriferous sand and gravel at the back of the beach. In approaching this coast we encountered a very heavy swell, with the water changing to a dark brown colour and after passing through it tacked off shore, hove to, and sounded near its outer limit but found no bottom with 84 fathoms of line.”

Koos Bay.—At nearly 2 miles E.N.E. from the northern extremity of cape Arago is the wide and well-marked entrance to Koos bay. The south point, named Koos head, is high and bold, being the base of the hills forming the cape; it consists of a precipitous rocky bluff, extending from the inside of the entrance as far as cape Arago.—this, of course, does not change, but the beaches around it alter considerably,—places in which the bed rock is at times bare, will, at others, be covered by several feet of sand, always, however, presenting bold sides to the channel inside of the rock which lies at the south side, and which has been known to be on low water mark. The north point of the bay is low and sandy, with shifting sand dunes that reach 100 feet in height. In 1861 a narrow channel across this point, formed a tolerably large island, which was washed away before the close of the season. Such changes are constantly taking place, and involve changes in the bar and channel. The points lie nearly north and south of each other, and about $\frac{1}{2}$ of a mile apart.

The bar (1861) lies N. 62° W., 1 mile from Koos head; N. 85° E., $1\frac{1}{2}$ miles from cape Arago, and its width between the 12-foot lines on the north and south sides is only 150 yards, with a maximum depth of 13 feet;—thence the channel, increasing in width, runs straight to the north tangent of the head, with 10 fathoms of water at that point. In 1853 and 1854 a depth of only 9 to $9\frac{1}{2}$ feet could be found on the bar. During the working season of 1861 the bar moved northward, thus indicating great changes in this as in all other river bars on the coast. Vessels enter and leave on the flood tide because the bar is smoother; with the ebb there is a heavy break, unless the sea be remarkably smooth. The currents run very strong, as might be supposed, from the extent of the bay and the size of the channel.

The sea has been observed to break completely across the entrance in moderate north-west weather, and the mail steamer has tried to enter, but upon seeing the danger would not take the risk. In 1861 the party examining it could get but one day's work on the bar during several months. In October, 1862, the surveying brig *Fauntleroy* could not enter.

Traffic is drawn hither by the mining of lignite, which is carried to the San Francisco market. It has been found unfit for steamship consumption, but it is used for small stationary engines and domestic purposes. A tug-boat is employed at the entrance for the towing of vessels over the bar.

Tides.—The corrected establishment at the port is 11h. 26m. The mean rise and fall of tides is 5.1 feet, of spring tides 6.8 feet, and of neap tide 3.7 feet.

The approximate geographical position of Koos head is lat. $48^{\circ} 21' 4''$, long. $124^{\circ} 18'$.

The bay is very irregular in outline, and its general shape is somewhat like the letter U, with the convexity to the north. One small branch stretches southward behind Koos head; it is called the south slough, and has but 2 or 3 feet of water in it. North of the entrance the bay proper begins, and has a good depth of water. Abreast of the north point the width is 300 yards, and the depth from 3 to 7 fathoms; thence northward it increases in width to nearly a mile, and runs very straight on a N. by E. $\frac{1}{2}$ E. course. The channel runs on the eastern side of this part, the western half being filled with sand flats and shallows. A sunken rock, called "Fearless", is on the eastern side of the channel, abreast of the upper part of the rocky shore. The whole length of the bay is believed to be about 25 miles, the head of it being a little further south than the entrance. Koos river empties into the head of the

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bay, and will give passage to boats for 20 miles from its mouth, where a small slough that empties into the Coquille river is so near as to leave a portage of only 1½ miles between the two waters, and about 15 miles from the mouth of the Coquille.

Excepting the peninsula, which forms the western shore of the bay north of the entrance, the entire country is an immense forest of various kinds of pine. No land for cultivation is found without clearing, and even on Koo's river the bottom lands, which afford excellent soil, have to be cleared of the thick growth of laurel, maple, and myrtle. The coal mines are beyond the great bend, near the head of the bay, and on the western side.*

UMPQUAH RIVER.—North of Koo's bay to the Umpquah river is another straight, low sand beach, with sand dunes, backed by a high ridge of hills densely timbered. The shore runs nearly North, presenting a very white appearance when the sun shines upon it, and having from 10 to 15 fathoms of water 1 mile off the beach. The southern point of the entrance to the river is a marked spur of the mountains from the south-east, and is bordered by sand dunes. The north side of the entrance is a long range of white shifting sand hills, running with the coast for 2 miles, and suddenly changing to high, rocky hills covered with wood. The river is the largest stream entering the Pacific between the Sacramento and Columbia rivers. It is 51 miles N. ½ W. from cape Orford, and 21 miles north of cape Arago. The lower reach of the river is long and narrow running nearly North for 6 miles; bordered on the south side by a rocky, wooded shore; on the north, for 2 miles, by loose sand hills, changing after the 4 mile to sand sparsely covered with coarse grass, bushes, and fir, and in 4 miles to steep, high, rocky banks covered with large trees. An immense flat, nearly bare at low water, stretches southward from the north point to within 300 yards of the south side of the entrance, through which narrow space runs the channel, having (1853) a bar with only 18 feet upon it, and less than 100 yards wide. From the bar the point of bluff, just inside the entrance, bears N.E. by E., and is distant 1½ miles. During the year 1851 or 1852 two range marks were placed on the south shore for running in by, and they are frequently referred to as data by which to trace the changes of the bar; but the captain who erected them has asserted that the bar was not on their range, but to the southward of it.

In January, 1858, it was announced that the bar had been marked by buoys. Two third class nun-buoys, painted white, with white and black perpendicular stripes, are placed in line with the lighthouse, which bears from them E. by N. ½ N. The inner buoy is just within the bar, and in 8½ fathoms at mean low water, and can be passed on either hand, but only

* In the United States Coast Survey Report for 1861 is the following—"The channel in Koo's bay presents a good depth of water. It passes along the western shore, and vessels should be careful to avoid being set near the eastern shore, as several reefs make off from the rocky bluff which forms that side, opposite to and a mile above the entrance.

The peninsula which separates the bay from the ocean is composed entirely of sand, some of the hills on it attaining an elevation of 100 feet. The sand shifts so much, with strong winds, that in one case the part of a hill on which a signal had been set gained 15 feet in height in the course of a few weeks.

The trade of Koo's bay consists of lumber and coal. Of the former, the laurel, myrtle, &c., are extensively used on the Western Coast in the manufacture of furniture. There are at present two saw-mills in operation, capable of turning out about 15,000 feet per day."

close to it. The outer buoy is just outside the bar, in 10 fathoms at the same stage of the tide, and can also be passed on either hand. Keeping the two buoys in range with the lighthouse, 14 feet may be carried over the bar at mean low water.*

These directions show that the bar of the river has moved about 400 yards to the northward of its position, as determined by the hydrographic survey of 1853, and has, moreover, deepened. In light weather it can be readily determined by the breakers on each side, but with a heavy swell the sea is terrific. In October, 1852, the Coast Surveying steamer *Active* lay off the bar two days trying to get in, but found it impracticable. Several steamers have thumped heavily on the bar, one nearly carrying away her stern-post, and in 1858 the mail steamship *Columbia* in coming out had her decks swept fore and aft by the huge combers rolling in like high walls. In January, 1861, when going in, this same steamer suffered still more terribly. Several vessels have been lost at its entrance, and within a very recent period no pilots belonged to the river, because the trade was too small to pay.

During the early part of November, 1858, the bar at the entrance to the Umpquah changed greatly, and the depth of water upon it was so much decreased that the steamship *Columbia*, which thumped over it, could not leave the river for several weeks. Upon sounding at the entrance it was found that the channel across the bar had moved about $\frac{1}{2}$ a mile northward of its former position.

From the bar the light bears E. by N. $\frac{1}{2}$ N., distant about a mile (1858). After crossing the bar the channel, when approaching the lighthouse, runs close to the south shore, and increases in depth from 8 $\frac{1}{2}$ to 13 fathoms off the point of bluff. Abreast of the meeting of the sand beach and bluff on the south side, lies a rock, visible at extreme low tide, upon the 8-fathom line. It is not laid down on any chart, nor has its position been accurately determined. It has deep water around it. From the point of bluff vessels steer across the river to strike the east side of the north point about $\frac{1}{2}$ of a mile from its extremity, then haul across E.N.E. to the other shore, close along which the channel runs. This course takes them clear of a flat and rocks in mid-river, and bearing E.N.E. from the south end of the north point, and North $\frac{1}{2}$ of a mile from the point of bluff on the south side. The small indentation of the shore-line on the right, after making the first stretch from the point of bluff, is called Winchester bay, having no water, and being but an extensive mud flat. Three miles inside the lighthouse the river continues $\frac{1}{2}$ a mile wide, then expands to 1 mile, and is filled with numerous extensive sand and mud flats. Five miles from the lighthouse it bends sharply to the eastward.

This river is said to drain an extremely fertile region, abounding in prairie land well adapted to agriculture and grazing. Ross Cox mentions a pine tree discovered in the Umpquah valley measuring 216 feet to its lowest branches, and being 57 feet in circumference. The Indian name for the river below the rapids is Kah-la-wat-set, and to the upper part they apply the name Ump't'quah.

From the Umpquah the coast runs in a remarkably straight line N. by W. $\frac{1}{2}$ W., to the south point of the entrance to Columbia river, in no case varying more than 8 miles eastward of the line joining these two places.

* We are ignorant if this bar is still buoyed. It is subject to such great and frequent changes that a stranger must not attempt to enter the river without having the assistance of some one well acquainted with it. The light has been discontinued, but the building may possibly remain (1867).

Heceta Bank.—N.W. by N., distant 66 miles from cape Orford, is the southern end of a bank extending parallel with the coast for 80 miles, and about the same distance from it. The least depth yet discovered upon it is 48 fathoms, and the nature of the bottom is very variable, there being blue mud, coarse blue sand, coral, pebbles, gravel, mud and shells. Coasting vessels have often reported passing over localities having a heavy swell upon them, and one frequently so reported near the Umpquah led to the examination which discovered this bank.*

Cape Perpetua.—After leaving the Umpquah 2 or 3 miles, a bold rocky coast, with high steep hills covered with timber, runs straight for about 8 miles, changing to low sandy beach with sand dunes, backed by a high ridge of hills. This continues for 15 miles, when the hills stretch out to the shore and crowd upon it for 13 miles, to end abruptly in steep bluffs forming cape Perpetua. The face of the cape is nearly 5 miles long, with very slight projection from the straight trend of the shore; it is very high, and has a regular although steep descent to the shore, bringing the trees to its very edge. The approximate geographical position of the cape is lat. $44^{\circ} 19'$, long. $124^{\circ} 6'$, and from it the lighthouse at Umpquah river (the light discontinued) bears S. by E. $\frac{1}{2}$ E. distant 30 miles.

From the Umpquah river to cape Perpetua, at a distance of a mile from the shore, are soundings of from 8 to 14 fathoms.

In recent maps a small stream called the Sciistum river is shown as opening south of cape Perpetua. It was not seen by the surveyors in 1853 from the distance of a mile, but they had reason to believe that there is a stream with the name of Sci-us-clau, (pronounced Sai-yusé-claw), emptying about 25 miles above the Umpquah.

Northward of cape Perpetua the coast range of hills is cut by numerous valleys, through which flow many small streams to the ocean.

Yaquinnah river.—Nine miles north of cape Perpetua is the mouth of a stream believed to be the Yaquinnah. It is said to expand into a bay, 8 miles long by $1\frac{1}{2}$ wide running nearly East, and very much contracted at the middle, where a small islet exists. The south head to the entrance is formed by a spur of the hills from cape Perpetua. The north point has likewise a bold head with a low sand spit stretching southward $\frac{1}{2}$ a mile. The entrance is in latitude $44^{\circ} 27'$, (approximate).

Recent maps place the Alciyo river in about this latitude. No name is given in the last Coast Survey reconnaissance, and it was not seen at all by Lieut. McArthur U.S. Navy, in 1850.

The names of the streams hence to the northward are very conflicting, and will continue so until a land exploration is made along the seaboard for determining their peculiarities and the latitudes of their mouths.

Caletee river.—North of cape Perpetua the shore continues straight, high, and bold for 6 miles, when a cluster of rocks occurs, and the bluff changes to low sand beach, running nearly to the mouth of a small stream about 5 miles southward of cape Foulweather, called Alseya on the Coast Survey reconnaiss-

* When Heceta was upon this coast, and in this vicinity, he said—"On Sunday I found great differences of depth, at 7 leagues I got bottom at 80 fathoms; and nearer the coast I sometimes found no bottom." Should a thorough examination of his discoveries here satisfactorily show that he did really cross this or any yet undiscovered adjacent bank, it would be a tribute to his explorations on this coast to apply his name to it.

ance of 1850, and Celetse on the original sheets of 1853; the latter name is the proper one. The north head, which is bold, has a rock close under it. Thence the shore is low and sandy to cape Foulweather. The country in the interior is very broken and mountainous, and covered with wood.

Cape Foulweather.—From cape Perpetua, to this cape the soundings at about a mile from the shore, range from 7 to 12 fathoms. The cape is in lat. $44^{\circ} 45'$, long. $124^{\circ} 4'$, and consists of a high, bold headland, $\frac{1}{2}$ a mile in width, jutting out about $\frac{1}{2}$ a mile from the low beach, and backed by high mountains. It is covered with wood, and has several small rocks on its south-west face, with one rocky islet a mile from it. Northward of the cape are three rocky islets standing a short distance from the low beach, and readily distinguished by being projected against it. In August 1853, the astronomical party of the coast survey was very desirous of effecting a landing on or near this cape, but the sea was rolling in too heavily to warrant the attempt. There was no appearance of a landing being at all feasible, except in remarkably quiet weather.

This cape was named by Cook on the day he made the coast, March 6th, 1778, but the point of the headland, so called on the Coast Survey reconnaissance of 1853, is not that referred to by him. At noon he was in lat. $44^{\circ} 38'$, and the land extended from N.E. $\frac{1}{2}$ N. to S.E. by S., about 8 leagues distant. In this situation he had 73 fathoms over a muddy bottom, and 90 fathoms a league further off shore. He describes the land of moderate height, diversified by hills and valleys, and principally covered with wood. No striking object presented itself, except a high hill with a flat summit, which bore East from him at noon. This may have been what he subsequently called cape Perpetua. At the northern extreme the land formed a point, which he named cape Foulweather, from the exceeding bad weather he met with soon after. The expression "northern extreme" has led some geographers to place the cape as high as lat. $45\frac{1}{2}^{\circ}$, but he judged the Foulweather he named to be in $44^{\circ} 55'$. Being here driven off the coast by continued bad weather, he had no opportunity to verify his position, and did not sight the land again until in lat. $47^{\circ} 5'$, thus passing by the entrance to Columbia river. Vancouver places it in latitude $44^{\circ} 49'$. Both of these determinations evidently refer to the northern part of the high land.

Nekas river.—Soon after passing cape Foulweather the shore becomes abrupt and moderately high, with an increased depth of water immediately off it. Four miles south of the Nekas, which is in lat. $44^{\circ} 56'$, it changes to low sand dunes stretching into a narrow point, forming the south point of the stream, while the north point is a low bluff. The entrance is very narrow and shoal, and inside the river is reported to spread out into a bay of about a mile in extent, and to receive the waters of a stream draining a valley coming from the eastward.

From the Nekas river to cape Lookout the distance is 24 miles, and course N. by W. $\frac{1}{2}$ W., with a shore-line broken by several small streams, amongst which are the Nechesne in lat. $45^{\circ} 2'$, with rocks in the entrance; the Nes-tuggah in lat. $45^{\circ} 6'$, having a large rock off its mouth; and the Nawuggah in lat. $45^{\circ} 14'$, having on the south side of its entrance a single rocky islet, hereafter referred to.

Cape Lookout.—The soundings from cape Foulweather to this cape show from 18 to 81 fathoms of water at the distance of a mile from the shore, increasing from 18 fathoms north of lat. 45° .

This cape is situated in lat. $45^{\circ} 20'$, long. $124^{\circ} 0'$. It projects somewhat sharply into the sea for $\frac{1}{4}$ a mile, and as seen from the south the top is tolerably flat and regular; its highest part is considered to attain an elevation of 8000 feet. The face directly toward the ocean is perpendicular, high, and toward the south destitute of trees. About 8 miles southward of it is a large single rock off the Nawuggah, estimated to be 250 feet high, and standing well out from the low sand beach behind it. No rocks lie off this cape, but one appears very close inshore, about a mile northward of it.

Cape Meares.—At 2 or 3 miles after leaving cape Lookout the land falls to a low sand beach, behind which is a long lagoon, called the Nat-a-hats, stretching northward, and having an opening under the south head of the well marked point to the northward, which is the termination of a spur or ridge running from the south-eastward, presenting an abrupt front to the ocean for about 2 miles, and being part of the western boundary of Tillamook bay. Mr. Davidson, U.S. Coast Survey says "When coming down this coast in the fall of 1857, we made a few notes upon some objects, and find the following memorandum made whilst near this point: 'Three high rocks (one arch) off point south of False Tillamook; one more on the north side.' Not being then aware of any doubt as to the name of the cape, no other particulars were noted. Four rocks are laid down off the south-west face on the Coast Survey reconnaissance of 1850, and one on the north. Three large rocks and one small one are laid down off the south-west face in the original sheets of the reconnaissance of 1853, the most distant being 1 mile from shore, with several small ones between them and the shore, and two or three others off the north-west face.

In 1775 Heceta placed La Mesa (the Table) in latitude $45^{\circ} 28'$ —a flat-topped mountain, seen at a great distance.

In July 1788, Meares, in the *Felice*, after passing False Tillamook, says—'The distant southerly headland we called cape Lookout. This cape is very high and bluff, and terminates abruptly in the sea. At about the distance of 2 miles from it there rose three large rocks, which are very remarkable for the great resemblance they bear each other. The middle one has an archway, perforated, as it were, in its centre, through which we plainly discovered the distant sea. They more particularly attracted our notice as we had not observed between King George sound and this place any rocks so conspicuously situated near the land; their distance from each other might be $\frac{1}{4}$ of a mile, and we gave them the name of the Three Brothers. By 8h. p.m. we were within 8 or 4 leagues of cape Lookout, which we judged to lie in lat. $45^{\circ} 80'$ N., long. $235^{\circ} 50'$ E. ($124^{\circ} 10'$ W.)

In 1792 Vancouver described it as a small projecting point, yet remarkable for the four rocks which lie off it, one of which is perforated as described by Meares. He places it in lat. $45^{\circ} 32'$.

In the Coast Survey reconnaissance of 1853 the northern part of this cape is placed in lat. $45^{\circ} 30'$, long. $123^{\circ} 58'$ and stretching southward 2 miles to the cluster of rocks above described. We applied the name to this cape in 1857."

Tillamook Bay.—On the Coast Survey reconnaissance of 1853 the entrance to this bay is placed in lat. $45^{\circ} 34'$,—4 miles north of cape Meares. The southern point is low, and the termination of a spur from the crest of the cape, whilst the north head is high and bluff. The entrance is very narrow, and reported to have very little water upon the bar; inside it expands into a long wide bay, stretching to the S.S.E. behind cape Meares. No survey has

yet been made of it, and some doubts are expressed about the enlarging of the river to form a bay. Two miles northward of the northern head are a couple of large rocks; thence the coast runs nearly straight to cape Falcon, receiving a considerable stream, called the Nehalem, in lat. $45^{\circ} 41'$. Clarke, when about 5 miles south of Tillamook head, says that "the principal town of the Killamucks is situated 20 miles lower (south) at the entrance to a creek called Nisee, expanding into a bay, which he named Killamucks bay. Upon this bay were several Killamuck towns. Killamuck river is at the head of the bay, 100 yards wide, and very rapid; but having no perpendicular fall, is a great avenue for trade. There are two small villages of Killamucks settled above its mouth, and the whole trading portion of the tribe ascend it till by a short portage they carry their canoes to the Columbia valley, and descend the Multnomah to Wappatoo island." This information he obtained from Indians and traders. On this short expedition he made all his distances from cape Hancock and point Adams too great, and reducing the forementioned 20 miles by the proper proportion, it would give us 18 miles as about the position of the Nehalem. His name seems to agree with this, but the description applies to what is generally known as Tillamook bay.

The shore about the Nehalem is low and sandy, with sand dunes backed by high wooded hills, and cut up by many valleys. It was here that Meares stood in for an anchorage, (July 1788,) until he found bottom in 10 fathoms, but hauled out again and named the place Quicksand bay, and the adjoining headland north, cape Grenville.

Cape Falcon.—The northern part of this headland lies in lat. $45^{\circ} 47'$, long. $127^{\circ} 58'$. When passing it close in 1857, the surveyors considered it to be not less than 8000 feet high;—its sea-face falls precipitously to the ocean, and off it are two prominent rocky islets. Seen from southward the top appears irregular and the hills inshore fall away. Like some other headlands in this district, the southern face of the cape is destitute of trees, but covered with a thick growth of grass, bushes, and fern. Two miles south of it is a stretch of sand beach and sand dunes.

From cape Lookout to this headland a depth of 20 fathoms may generally be found at a mile from shore; but, as upon the whole coast, a heavy regular swell always rolls in from the west. The Indian name of the head is Ne-a-kah-nie.

Tillamook Head.—This prominent cape, in lat. $45^{\circ} 58'$, is 12 miles N.N.W. from cape Falcon, and 19 miles S.E. by S. $\frac{1}{2}$ S. from cape Hancock. The coast from cape Falcon curves 2 miles eastward; it is bold and rugged, guarded by many high rocky islets and reefs, and in several places bordered by a low sand beach at the base of the cliffs. Two miles south of the head, is said to be a creek 80 yards wide at its mouth, named Ecola. From the south bar of Columbia river the summit of Tillamook head appears flat for some distance back; it has an estimated height of 2500 feet. Off the face of the cape, which is very steep, lie several rocky islets; one of them is high and rugged, and stands out about a mile from the south-west face. Around it the water is believed to be deep, a steamer having been seen to approach almost upon it in a thick fog; but inside of it lie several high rocks. From the bar of Columbia river, two rocks can be distinctly seen, the inner being the larger, and its apparent distance from the head about half the apparent height of the cape. Whether the smaller is the one off cape Falcon,

has not been determined. As seen from southward the large rock has a perpendicular face to the westward, and slopes to the east; it is the resort of thousands of seals.

This cape is a good landmark for making the mouth of Columbia river, no such high headland occurring on the coast northward of it for over 70 miles, and before being up with it the moderately high land of cape Hancock is seen and made as two islands. The face of the cape is much broken, and formed principally of yellow clay, presenting a bright appearance in the sunlight. It has been said that at 1200 feet above the ocean occurs a stratum of white earth, used by the Indians as paint; and that the hill-sides slip away in masses of 50 to 100 acres at a time.

Upon the top of the cape, Clarke says (1805—6) he found good, sound, solid trees growing to a height of 210 feet, and acquiring a diameter of from 8 to 12 feet. From Tillamook head southward many miles was the country of the Killamuck Indians, then estimated to number 1000 people, and having 50 houses.

The coast from point Orford to Tillamook head is well diversified by high hills and valleys, presenting a country well watered by numerous small streams emptying into the ocean. It is densely covered with various woods, and for a few miles inland looks favourable from the deck of a vessel. At some distance in the interior are ranges of mountains, the general direction of which appears to be parallel with the coast-line, which attains its greatest elevation and compactness between cape Falcon and Tillamook head, after which a sudden and marked change takes place, and a stretch of low sandy coast commences and runs for nearly 100 miles northward, only broken by cape Hancock, the north point of Columbia river.

COLUMBIA RIVER.—The great valley of Columbia river is by far the most important and interesting part of Oregon, not only on account of the variety of soil, productions, and climate, but also from its being the great and only line of communication between the sea coast and the interior. The river is estimated to be 750 miles long, and is navigable from its entrance, a distance of about 100 miles, as far as the Cascades, by vessels drawing over 12 feet of water. Although it possesses at all times a good depth of water, it is so difficult and dangerous to enter, that it can be said to possess but few advantages as a port; it therefore is not of such value to the district as the length of its course and the magnitude of its waters would lead us to expect. It also has the disadvantage of a shifting bar, so that *it is impossible for large vessels to enter without a pilot.*

The coast at 2 miles northward of Tillamook head is followed by and consists of a peculiar line of low sandy ridges, running parallel to the beach towards point Adams, (the south point of entrance to Columbia river), and appearing like huge sand waves covered with grass and fern. Between some of them run small creeks, whilst the country behind is low, swampy, and covered with wood and an almost impenetrable undergrowth. About 8 miles north of the head Clarke says a beautiful stream empties with a strong rapid current. It is 85 yards wide, and has 8 feet at its shallowest crossing.

Point Adams is low and sandy, covered with bushes and trees to the line of sand beach and low dunes; and although it is reported to have washed away over $\frac{1}{2}$ a mile since 1841, the surveyors were able to detect only comparatively small changes since the survey of Broughton in 1792. The

geographical position of the point (at $\frac{1}{2}$ a mile inside it) is, lat. $46^{\circ} 12' 30''$, long. $123^{\circ} 56' 56''$.*

Cape Hancock.—This cape is the only headland from Tillamook head to lat. $47^{\circ} 20'$ that breaks the low line of shore. It presents a geological formation not before met with on the seaboard, being composed of horizontal columnar basalt, rising to an elevation of 287 feet, disposed in a succession of huge round hills, broken on the sea front by short strips of sand beach, and covering an irregular area of about 8 miles by 1 mile. The sea-faces of all the hills and irregularly projecting knobs rise perpendicularly for many feet, then slope slightly inshore to narrow ridges; are destitute of trees, but covered with grass, fern, and bushes, and have an excellent though thin soil. Inland of their crests the trees commence, and their tops reaching above the summits of the hills increase their apparent height. The inshore slope of the hills is more gentle, so that paths can be easily carried to their tops; in 1851 an ox-team road was constructed to the summit of the cape. When the evening fogs from the northern bays do not cover the cape, a dense fog has occasionally been observed rolling down the river about sunrise, enveloping everything below the top of the cape which consequently looked like an island of less than 100 yards in extent, and surrounded by the river fog. The evening fogs are so regular that the surveyors state they were 85 days on the cape before obtaining a single night's observations.

As seen from southward, when off Tillamook head, cape Hancock is made as two round-topped islands; approached from north-westward it rises in a similar manner; from the westward and south-westward it appears projected upon the mountains inland, but the slightest haziness in the atmosphere brings it out in sharp relief. This cape being basaltic, and showing an almost iron front to the river and sea, it is impossible that, as asserted by some, it can have been worn away some hundred feet by the sea and strong currents that run by it. The Indian name for cape Hancock is Käh-eeset†

* At present (1867) point Adams has not a lighthouse upon it, but as the establishment of one has been repeatedly urged upon the authorities by those engaged in the coasting trade between San Francisco and Juan de Fuca Strait, there is a probability that when the trade of Columbia river becomes more developed a light of some kind will be established on the point. During the early part of the evening dense fogs, formed over the waters of Gray and Shoalwater bays, are brought southward by the summer winds, and roll over cape Hancock, which they completely shut in before reaching across the river, so that a vessel might make a light on point Adams when the other cape was invisible; but by seeing both lights (that on point Adams and that on cape Hancock) a vessel could hold any required position at night off the entrance to the river, and run in and take a pilot upon the first opportunity; for it would be assuming too great a risk to enter the river at night, or without a pilot. The Indian name of point Adams is Klaat-sop.

The beach around point Adams and southward of it some distance is usually called Clatsop beach. Upon it, many years ago, before the whites occupied the country, a Chinese or Japanese junk, with many hands and a cargo of beeswax, was cast ashore and went to pieces; but the crew were saved. In support of this Indian tradition, there are occasionally, after great storms, pieces of this wax thrown ashore, coated with sand and bleached nearly white. Formerly a great deal was found, but now it is rarely met with. Sir Edward Belcher, R.N., mentions having a specimen; and many people on the Columbia possess pieces. In a late work (Perry's Japan) this wreck has been confounded with another that took place near cape Classet (Flattery).

† "On the first landing beach on the inside of the cape we found a deposit of auriferous and ferruginous "black sand," the flakes of gold being very small and scarce. This ferruginous deposit—the "black sand" of the California gold digger—caused a local disturbance in the magnetic variation, amounting to $26^{\circ} 2'$, being that quantity less than the

A lighthouse has been erected on the pitch of the cape, at a little to the west of the south-east point, and about 95 feet below the highest part. The tower is whitewashed, placed 192 feet above the level of the sea, and being 40 feet in height and projected against a dark green background, shows well in daylight. The light is *fixed*, at 280 feet above the sea, and can be seen from the distance of about 22 miles. Its geographical position is, lat. $46^{\circ} 16' 88''$, long. $124^{\circ} 2' 18''$.

Counting round seaward from southward, the light commands the horizon for about 135° ; that is, from S.S.E. to W.N.W.; so that vessels coming from northward cannot see it until nearly in the latitude of the river. Placed on the top of the cape, it could have been easily made to show over the northwest part of it, and would also have commanded the entire river and Baker bay.

From cape Hancock point Grenville bears N.W. by N. $\frac{1}{2}$ N., distant 62 miles; Destruction island N.W. by N., 84 miles; and Flattery rocks N.W. $\frac{3}{4}$ N., 118 miles.

A *fog-bell* of 1600 lbs. placed on the bluff in advance of the light-tower, is sounded during foggy and thick weather, night and day. The machinery is on a level with the ground, in a frame building, whitewashed, and with the front open to receive the bell.

The entrance to the Columbia, the great river of the Pacific coast, is 5 miles wide between the nearest parts of cape Hancock and point Adams, bearing S. $58\frac{1}{2}^{\circ}$ E., and N. $58\frac{1}{2}^{\circ}$ W. from each other; but the passage is obstructed by shifting shoals that lie 2 or 3 miles outside of the line joining the points. The numerous surveys that have been made of the river prove so conclusively the great changes which the channels through the shoals undergo, that it is useless to attempt to give any directions for it. The best advice we can offer therefore is, when up with the bar, *wait for a pilot*. The mail and coasting steamers enter the south channel, (October, 1857,) parallel and close to the beach south of point Adams; but, with a heavy swell from westward, they roll very much after rounding the point. In heavy weather some of them prefer entering the north channel, although it gives a detour of some miles, but that bar has, and always has had, more water upon it than that at the south channel, and does not so frequently change its position, from the unwearied nature of the cape. Sailing vessels cannot beat into the south channel against the summer winds blowing from north-westward, but almost invariably come out through it. The heavily laden vessels of the Hudson Bay Company have always used the north channel.*

During heavy weather, and especially in winter, the sea breaks with terrific fury from north-west of cape Hancock well to the southward of point Adams.†

declination found upon the summit of the cape. Here we also found the remains of the ovens used by the shipwrecked crew of the United States sloop-of-war *Peacock*, lost on the north shoals of the north channel in 1841." U.S. Coast Survey.

* The bar of the north channel has *usually* a depth of not less than 4 fathoms upon it, and that of the south channel about a fathom less, but the latter channel changes so much, in some seasons closing altogether, that no dependance should be placed upon the depths as now stated.

† "The mail steamer has been known to try for 60 hours to find the smallest show of an opening to get in. Sailing vessels have laid off the entrance 6 weeks, waiting for a fair opportunity to enter, and many lie inside for weeks trying to get out. The mail steamer, meanwhile, exerting all her power, would drive through the combers, having her deck swept fore and aft by every sea. Few places present a scene of more wildness than this

During the season of freshets, about June, the pilots say that the the river brings down such a vast body of water that they can frequently take up for use fresh water upon the bar.

When off the entrance in fine, clear weather, the beautiful snow peak of mount St. Helens shows over the lowest part of the land inside, and apparently in the middle of the river valley. It is very regular in outline, and presents a pyramidal appearance, having a base equal to either side. It is more than 75 miles eastward from the entrance to the river, and attains an estimated elevation of 18,500 feet. It is volcanic, and occasionally discharges volumes of smoke. On the 28rd of November, 1842, during an eruption, the ashes from it fell over the Dalles of the Columbia like a light fall of snow. On the 18th of November, 1848, mounts St. Helens and Rainier were both active.

The current.—In October, 1851, whilst lying at anchor in the south channel off Sandy island, the strength of the ebb current was measured, and found to be nearly 5½ miles per hour.

From the entrance to the mouth of the Cowlitz river the general course of the Columbia is E. by N., and the distance in a straight line 46 miles from the bar, and by the windings of the river about 52 miles. The Cowlitz runs N.N.W. for 24 miles; thence N.E. to its headwaters in the Cascades; it is navigated by canoes about 28 miles to the Cowlitz landing. The stream is very rapid, and boats have to be poled the greater part of the way; at high stages of the water they are pulled up by hauling upon the bushes growing upon its banks. At the Cowlitz landing travellers take mules or horses through to Puget sound, a trip of 52 miles. On the west bank of the Cowlitz, 5 miles above its mouth, are a few small houses, locally known as the town of Monticello. On the south bank of the Columbia, opposite the Cowlitz, is another small settlement, called Rainier.

From the Cowlitz the next course of the Columbia is S. 82° E. for 29 miles to the mouth of the Willamette river. About 16 miles above the Cowlitz the Warrior branch or slough of the river makes in from the west side and runs around Multnomah island, coming into the Willamette 2 miles above its mouth. The Willamette continues the same general course of the Columbia for 16 miles to the falls, where is situated the town of "Oregon City," destined to become a place of importance, on account of the extensive water-power; the river there falling perpendicularly 88 or 40 feet. Six miles lower down on the Willamette is the rapidly improving town of Portland,

bar during a south-east gale, contrasting strongly with many times during the summer, when not a breaker is seen to mark the outline of the shoalest spot. From the summit of cape Hancock we have often watched the bar in varied states of wind and weather, and crossed it when calm and breaking. What is most needed here is a powerful propeller tug, which the amount of trade would assuredly warrant, when we know that the much smaller trade of Humboldt bay supports handsomely a tug for that bar. In bad weather the pilot-boats cannot venture out, but a steamer might; and the mail steamers, to avoid delay, now regularly carry a bar pilot with them." Mr. Davidson, U.S. Coast Survey.

Commander Wilkes, U.S. Navy, says of the breakers on the bar—"Mere description can give but little idea of the terrors of the bar of the Columbia; all who have seen it have spoken of the wilderness of the ocean, and the incessant roar of the waters, representing it as one of the most fearful sights that can possibly meet the eye of the sailor. The difficulty of its channel, the distance of the leading sailing marks, their uncertainty to one unacquainted with them, and want of knowledge of the strength and direction of the currents, with the necessity of approaching close to unseen dangers, the transition from clear to turbid waters, all cause doubt and mistrust."

situated at the head of ship navigation, with a population of nearly 5000. The valley of the Willamette is well settled, contains several thriving towns, and is remarkably productive.

The river takes its rise on the western slope of the Cascade range, about lat. 48½°, between the snow peaks of mount Jefferson and mount Laughlin; then runs westward to within 50 miles of the coast, and nearly in the latitude of cape Perpetua, turning sharply to the northward, and very slowly leaving the coast.

From the mouth of the Willamette the general course of the Columbia to fort Walla-Walla is N.E. by E. ¼ E., 170 miles.

Five miles above the Willamette, on the north side, is the military post of fort Vancouver, which, with the town of Vancouver, covers part of the grounds formerly occupied by the Hudson Bay Company as a mercantile station, but then designated as fort Vancouver. The Hudson Bay Company still have a trading station here, but their farms and grazing lands have been occupied by settlers. The site for a town is one of the most beautiful on the river, and capitally located for increasing trade.

About 80 miles further up the river we reach the foot of the Cascades, which are a series of rapids 4 miles long, where the river bursts through the eastern part of the Cascade range of mountains, the basaltic walls of which rise precipitously over 8000 feet on either side, presenting a magnificent sight. Below the rapids the current rushes by with great velocity and depth, but small steamboats ply regularly from Portland and Vancouver to the foot of the rapids; thence passengers are carried by stages to the head, where one or two fine steamboats convey them 50 miles to the Dalles. The Hudson Bay Company carried their large trading boats up the rapids by a system called cordelling. Steamboats have gone up 1 or 2 miles, and, in one instance, a brig, with every sail set and a moderate gale astern, was carried safely to the foot of the railroad, which runs from the head to within 1½ miles of the lower end. At each extremity of the rapids are small military posts.

The snow peaks of the volcanic mount St. Helens and mount Hood lie exactly in line with the Cascades, the former N.W. ¼ N., 85 miles distant; the latter S.E. ¼ S., 28 miles distant.

Mount Hood is an extinct volcano covered with cellular lava, and, according to Dana, is between 15,000 and 16,000 feet high. According to other authorities, it attains an elevation of 18,813 feet.

At the Dalles the river is contracted between narrow perpendicular walls, and during freshets rises 100 feet above its ordinary level.

East of the Cascades the forests cease, and above the Dalles stands the only tree in a stretch of 60 miles beyond Walla-Walla, where the river makes a great bend to the northward, in the direction of its source at the base of the Rocky mountains.

On the lower parts of the Columbia and Willamette many saw-mills have been erected since the gold discovery in California, and a large trade was carried on in lumber. Between San Francisco and Portland a very large and increasing general trade exists.

Commander Wilkes, U.S. Navy, makes the following general observations on Columbia river—"The principal dangers in the entrance are the cross tides, their velocity, and the influence of an under-current, together with the heavy swell. These become greater from the distance of the leading marks for the channel, and their indistinctness when the weather will permit entrance.

It is necessary to use them, in consequence of the compass bearings being of little or no use.*

It is safest to enter the river on the ebb-tide, with the usual north-west wind, which sets in about 10 or 11h. A.M., during the summer months. The entrance should never be attempted with a flood-tide and N.W. wind, unless the Clatsop channel be followed, and the sea is smooth.

When passing cape Hancock, care must be taken not to be becalmed by it; if this should happen, the only resource is to down anchor at once, and wait a favourable tide. The current will be found very strong. It sometimes runs from 5 to 6 knots an hour—a perfect mill-race—and no boat can make way against it when at its strength.

When entering the river, the following precautions should be attended to:—

1. The entrance should never be attempted when the passage between the north and south spits is not well defined by breakers; it is equally dangerous, whether it be concealed by the sea's breaking all the way across, or so smooth as not to show any break.

2. The wind generally fails, or falls light, in the passage between the north and south spits, if it blows but a moderate breeze; and leaves a vessel at the mercy of a strong tide and heavy swell.

3. The best time to enter and depart, is after ebb, and before quarter flood; the tide then runs direct through the channels, and is confined to them. With the prevailing westerly winds, for those intending to take the north channel, the best time to enter is after half-ebb, though the wind may be scant; yet the ebb-tide, acting on the lee bow, will enable the vessel to keep to windward, and avoid the spits on the middle sands."

Tides.—At Astoria the corrected establishment is 12h. 42m. The mean rise and fall of tides is 6.1 feet, of spring tides 7.4 feet, and of neap tides 4.6 feet.

The tide makes 40 minutes earlier at cape Hancock than at Astoria.

SHOALWATER BAY.—The bold cliffs of cape Hancock, after extending about 3 miles northward, change suddenly to a low, broad, sandy beach, running N. by W. $\frac{1}{2}$ W., 18 miles, in nearly a straight line to the southern point of the entrance to Shoalwater bay. At $1\frac{1}{2}$ miles behind this beach lies the southern arm of the bay. Its waters reach within 1 or 2 miles of the north side of the cape, and the portage from them to the Wappalooche, emptying into Baker bay (Columbia river) is said to be about a mile long, and

* After alluding to the loss of his consort, the *Peacock*, on the bar, he says—"The cross-tides change every half hour, and are at times so rapid, that it is impossible to steer a ship by her compass, or maintain her position; and no sailing directions can possibly embrace the various effects produced upon them by a vessel. A singular fact in illustration of this remark is, that the safest time to cross the bar is when both the tide and wind are adverse; and this is the only port, within my knowledge, where this is the case. During the summer, haze and fog occur almost every day, in the afternoon."

+ The coast from cape Hancock northward to Juan de Fuca strait is rocky, much broken, and affords no harbours, except for very small vessels; it must, therefore, be considered as extremely dangerous, and particularly on account of its outlying rocks. The soundings however, serve as a sure indication by which danger may be avoided, and safety can always be insured by not approaching the land into less than 70 fathoms. The bottom is believed to be regular, and to shelve almost gradually, until the depth of 90 fathoms is reached; but a short distance beyond that depth, and at about 15 miles from the land, the bank suddenly falls off, and no bottom is obtained with a line 200 or 250 fathoms long.

is always used by the Indians and settlers. The peninsula thus formed is covered with trees and a dense undergrowth of bushes. Within $\frac{1}{4}$ a mile of its extremity it becomes very low and sandy, and has a covering of coarse grass, but no trees. This point is known as Leadbetter point. The Indian designation is Chik-lis-ilh. Its approximate geographical position, is lat. $46^{\circ} 36' 45''$, long. $124^{\circ} 0' 45''$.

From Leadbetter point to Toke point (the north point of entrance to Shoalwater bay) the bearing and distance are N.W. by N. $\frac{3}{4}$ N., $5\frac{1}{4}$ miles. Half a mile of this point is low, sandy, and destitute of trees, but some tolerably high land covered with wood rises immediately behind it, being the only elevated ground between cape Hancock and point Grenville that approaches the shore-line. On account of this formation of the point it has been said that the entrance resembles that of Columbia river, but the surveyors assert that they were unable to detect any resemblance after passing near it several times. The isolated position of cape Hancock and the seaward face of its bold cliffs without trees form a peculiar feature. This, with Scarborough hill, partly bare, lying 5 or 6 miles eastward of it, the high mountains inland, and in clear weather the beautiful snow-peak of mount St. Helens, have no counterparts at Toke point, and should remove all doubt in regard to general resemblance.

The Indian name of Toke point is Quahpt-sum.

The lighthouse upon Toke point is $41\frac{1}{4}$ feet high, and shows a *fixed* light, varied by *flashes*, at 85 feet above the sea, visible about 14 miles. Its approximate geographical position, is lat. $46^{\circ} 44' 11''$, long. $124^{\circ} 2' 24''$.

The navigation of Shoalwater bay is *too intricate to be attempted by strangers without a pilot*, and there are reasons for believing that the channels are subject to great and frequent changes. The bay is seldom entered even by coasting vessels. Mr. Davidson, U.S. Coast Survey, has the following remarks upon it;—"There having been no survey of Shoalwater bay previous to the preliminary one of the Coast survey in 1852, and the completion of it in 1855, it is impossible to state what changes have taken place. Judging by the changes of the Humboldt, Umpquah, and Columbia bars, we should conclude that similar effects take place here. In less heavy weather than would cause the sea to break on the Columbia river bars, it breaks here with fury quite across the entrance. This description applies to 1852.

Four miles off the entrance a depth of 10 fathoms is found, and when well off shore a high double peaked mountain shows to the eastward, well inland. Meares noticed it, and placed it in latitude $46^{\circ} 30'$, quite close to the coast, designating it as Saddle mountain, a name it still retains, although one of the same name is found S.E. of point Adams.

At the present time there are two channels, denominated from their position the *north* and *south channels*, with a large shoal called the *middle sands* lying between them, and partly outside of the line joining the two points.

The bar at the *south channel* has 4 fathoms of water upon it, is a mile wide, and lies 2 miles off the beach south of Leadbetter point, with the northernmost trees bearing N.E. by E. Running in on this line a vessel shoals her water from 10 fathoms 8 miles off shore, to 4 fathoms 2 miles off; then gradually deepens it to 5 fathoms, when she should haul close up under the point of breakers northward of her, and about $\frac{1}{4}$ a mile distant; run along in from 6 to 7 fathoms until abreast of the low grassy point, when the course of the channel will be N. by W. $\frac{1}{4}$ W. for $1\frac{1}{4}$ miles, with from 8 to 10 fathoms,

hard bottom, its outline being well marked by the breakers outside. From thence a course N.E. by N. for 2 miles will lead to 18 fathoms, and over a mile inside the line joining Leadbetter point and Toke point, the western trees on Leadbetter point bearing S. $\frac{1}{2}$ E. $8\frac{1}{2}$ miles distant. If the tide is low, sand bars and flats will show on both hands, one directly ahead; the broad deep channel to the south-east distinctly marked by bare patches on either side, and a narrow deep channel to the north-west running into the north channel. From the last position the western trees on Leadbetter point bear South, distant 4 miles. The greater body of water passes through this channel, and the current runs very strong. In summer, with a north-wester blowing, it is a dead beat after passing the bar, and in some places the channel is less than $\frac{1}{2}$ a mile wide between the 8-fathom lines. Coasters do not enter it except with a southerly wind, and always pick out the channel from aloft. In summer they have a leading wind out, and start on the first of the ebb.

The bar at the *north channel* has about $8\frac{1}{2}$ fathoms upon it, and bears S.W. by S. $\frac{1}{2}$ S., 8 miles from the southern extremity of Toke point. It is about a mile in extent within the 8-fathom line.

In making the bay from southward in summer, work to the northward of Toke point, then run in and follow the shore outside of the breakers in 6 or 7 fathoms, gradually approaching them, and decreasing the depth to $4\frac{1}{2}$ and 4 fathoms, when the southern side of the elevated ground of the point bears N.E. by N. $\frac{1}{2}$ N. Then head up as near that course as possible, crossing the bar in $8\frac{1}{2}$ fathoms, and continuing in that depth for at least $1\frac{1}{2}$ miles, taking care not to decrease it on either hand. Keep under the breakers on the north side in from 5 to 7 fathoms, hard bottom, and increase the depth to 12 well inside the point, when its southern extremity should bear N.W. $\frac{1}{2}$ W., distant $1\frac{1}{2}$ miles. If it is low water, sand banks will show in different directions, and the channels will be tolerably well marked.

The present invariable practice of vessels entering is to seek out the channel from the mast-head. In calm weather the channels must be known, or a pilot employed, if one is to be found.

The north bar bears N.W. by N. $\frac{1}{2}$ N., distant 5 miles.

The *middle sands* lie between the two channels. The southern tail is S.W. $1\frac{1}{2}$ miles from Leadbetter point, runs N.W. by N. $\frac{1}{2}$ N. for $2\frac{1}{2}$ miles, then N.N.E. $2\frac{1}{2}$ miles, and E.N.E. $1\frac{1}{2}$ miles, with an average width of $1\frac{1}{2}$ miles. One mile outside of it soundings are found in 7 fathoms.

This bay, as its name implies, is so full of shoals that at low tides about one-half of its area is laid bare. Good but narrow channels are found throughout its extent, but no direction can be given for running them. Without a knowledge of them, or without a pilot, follow them only at low water. The currents then run with great velocity, and it is very difficult and frequently impossible to keep a course against them. The arm stretching southward toward Baker bay is 15 miles long from Leadbetter point, with an average width of not less than $8\frac{1}{2}$ miles, whilst the upper portion stretches to the N.E. for 9 miles to the north of the Whil-a-pah river, reckoning from the middle of the line joining points Toke and Leadbetter.

The principal stream emptying into the bay is the Whil-a-pah, at its north-east part. At about 9 miles from Toke point it is less than a $\frac{1}{2}$ of a mile wide, with low swampy banks and steep bluffs on each side about $1\frac{1}{2}$ miles apart.

The mouth of the Palux, or Copalux, lies 5 miles N.E. $\frac{1}{2}$ E. from Lead-

better point. It is $\frac{1}{2}$ a mile wide at its mouth, contracts very much in 2 miles, and is bordered by marshes, with numerous sloughs running through them.

The Nasal enters about 11 miles south from the Palux, and abreast of the middle of Long island. It has over 20 feet water at its mouth, with bluff banks for some distance, until it begins to expand, when it is bordered by flats.

Several streams open from the north side of the bay. One of these, the Necomanche, near the Whil-a-pah, has 6 feet in the main channel, and shows $1\frac{1}{2}$ miles wide at high tide.

There are three islands in the bay. *Pine island*, about $1\frac{1}{2}$ miles N.W. by N. off the mouth of the Palux, is a small sand islet of only 4 or 5 acres in extent, and occupied by oystermen. It is near the channel and the oyster beds which stretch for a couple of miles to the N.N.E. of it. The Indian name of this island is Nass-too. The north end of *Long island* is 8 miles from Leadbetter point. This island runs irregularly about S.E. for 6 miles, and has an average width of $1\frac{1}{2}$ miles. It is covered with a dense forest of fir and undergrowth. One mile S.S.E. of Long island is a very small islet named *Round island*, of only a few acres in extent, covered with wood and bushes. The shores of the bay, except on the peninsula, are mostly composed of low, perpendicular cliffs of a sandy clay, in which are strata of recent fossil shells and the remains of trees. Where the faces of the cliffs are not washed by the waters of the bay they slope gently, and have a small grassy shore at their base.

N.E. $\frac{3}{4}$ N., distant 6 miles from Leadbetter point, is a sharp narrow cliff, 60 feet high, making out into the bay, which is wearing it away, and has exposed many large basaltic boulders. No other place on the bay presents this geological feature.

The peninsula is a long, flat, marshy, and sandy plain, elevated but a few feet above the level of the sea, and covered, like the entire surface of this country, with a dense growth of gigantic forest trees, principally spruce, fir, and cedar, with a few specimens of maple, ash, and black alder. The spruce frequently attains a diameter of 8 feet. The Indian name of the peninsula is Tee-choots.

The shoals are covered with shell-fish, among which the oyster is the most abundant, and the principal article of export. They are small and have a coppery taste. Cod-fish and halibut abound; sturgeon, said to be of good quality, are plentiful, and salmon of several varieties and excellent flavour exist in infinite numbers. In spring vast shoals of small herring enter the bay. In winter wild fowl are innumerable, but these have been made shy by the bad shooting of the Indians. Black and white swan, geese, mallards, canvas-backs, &c., always reward the experienced sportsman.

The yearly shipment of oysters is about 30,000 bushels, and of piles and spars about 80,000 feet. The average value of exports is \$120,000. The number of vessels entering yearly is about 25, nearly all of which are schooners, counting an aggregate of 2500 tons. In 1855 the population on the bay was 190 males and 60 females.

This bay was discovered by Lieutenant John Meares, July 5th 1788, in the *Felice*, when proceeding in search of the Rio de San Roque of Heceta. He approached it until the water shoaled to 8 fathoms, when the breakers ahead warned him to haul off. "From the mast-head it was observed that this bay extended a considerable way inland, spreading into several arms or branches to the northward and eastward, and the mountainous land behind it was at a great distance from us." He saw "what appeared a narrow entrance at the

north-west part of the bay," but it was too remote for him to discover whether it really was so, or only low land. "From under the [low] point a canoe came out, containing a man and boy," &c. Unsettled weather prevented his sending in the long-boat to sound near the shoals, in order to discover whether there was any channel. He called it Shoalwater bay.

Vancouver endeavoured to enter in 1792, but, as it was breaking across the whole entrance, he considered it inaccessible to his vessels. He says, "The sandy beach was bordered by breakers extending 8 or 4 miles into the sea, and seemed to be completely inaccessible until 4 P.M., when the appearance of a tolerably good bay presented itself," and the point to the north was "somewhat more elevated than the rest of the coast," and in lat. $46^{\circ} 40'$.

It is asserted by settlers here that boats, canoes, &c., which have broken adrift and gone out of the bay, have, in every instance, been found on the beach north of the entrance, and generally between it and Gray harbour.

From Toke point to point Hanson, the southern side of the entrance to Gray harbour, the distance is $13\frac{1}{2}$ miles, and the hard ocean sand beach furnishes an excellent road that can be travelled at half tide by waggons. The slightly elevated sandy bank is level, covered with coarse grass, and free from timber for nearly $\frac{1}{2}$ a mile back, and to within 2 miles of the harbour. Back of this and parallel with the coast is a cranberry meadow, 6 miles in length, and separated by a narrow belt of scrubby fir. This meadow is drained by two small rivulets forcing their way through the sand to the ocean. San Francisco is the market for the cranberries, which are gathered by Indians and carried to Shoalwater bay and Gray harbour. Land otter and beaver have their homes around the meadows and small streams."

GRAY HARBOUR.—The following is a description of the bay according to the survey of 1862. The bar at the entrance shifts so frequently and appears to be subject to such very great changes that instructions for entering it soon become useless, *strangers must therefore obtain the assistance of a pilot.*

The entrance to this bay is formed by point Hanson on the south, and the southern point of Eld island on the north. The northern end of this island is connected with the outer part of point Brown at low water, but at high tide the beaches are a $\frac{1}{2}$ of a mile apart. The south end of the island lies N. 59° W., $1\frac{1}{2}$ miles from point Hanson; its length is $1\frac{1}{2}$ miles, and direction N. 50° W., with a breadth of 200 to 400 yards. Half-way between point Hanson and the island lies the north-east end of a shoal or middle ground, bare at low water, and stretching S. 15° W. for $1\frac{1}{2}$ miles, with an average breadth of $\frac{1}{2}$ of a mile. The channel in is between the north-east end of this shoal and the south end of Eld island; it had in 1862 a width of less than $\frac{1}{2}$ of a mile and a depth of 16 fathoms.*

* In 1860 the surveying brig *Fauntleroy*, drawing 10 feet of water, laid off the bar several days, the heavy breakers along the whole shoal allowing no clue to the bar, and the depth of water upon it unknown. At a comparatively smooth time the bar was sounded with a boat and the vessel followed, crossing on the last quarter of the ebb with 2 $\frac{1}{2}$ fathoms. In 1861 the entrance was reported tolerably good, and comparing favourably with the other bar harbours north of San Francisco. In June 1862, the same vessel laid off the bar several days, and finding no possibility of crossing, ran into Shoalwater bay, and the party being unable to procure a pilot that could carry her into Gray harbour, had to work from the former bay. There were only three days during the season when work could be executed on the bar, and the result showed that no well-defined channel then existed across the bar, which was very uneven, lumpy, and in one place had only 9 feet upon it. The channel was not straight, as anticipated, but the seaward end curved well to the northward.

The Superintendent of the Coast Survey has recommended to the Light-house Board the placing of buoys to mark the channel, and especially of one on the seaward extremity of the south sands, where the water probably breaks during heavy weather in winter, so much as 4 or 5 miles off shore. This buoy would be of great service to the coasting steamers.

In 1860, while the surveying vessel was lying off the bar, a current running to the northward at the rate of $1\frac{1}{4}$ miles per hour was distinctly noticed. An experience of two years has proved the set of the current along the coast to be always to the northward. Immediately off the harbour this current strikes the ebb current of the bay and deflects the mass of water to the northward, and carries the channel that way. With the flood current the mass of water sets over the south sands. It is estimated that the off-shore current runs across the bar at an average rate of 3 miles.

The Indians use a small swash channel under point Brown to avoid crossing the bar.

The peninsula terminated by point Hanson is about $\frac{3}{4}$ of a mile in breadth and $3\frac{1}{4}$ miles long, and covered with fir to within $\frac{1}{4}$ a mile of the point, which is a low sand spit embracing a small marsh. The general direction of the peninsula is north-west, and inside it lies South bay, with a width of $\frac{1}{4}$ a mile, affording the safest, and in fact the only safe anchorage near the entrance. More than half of this bay is occupied by mud flats. To secure the best position here, bring the northernmost trees on point Hanson to bear S. 71° W., distant $\frac{3}{4}$ of a mile, and anchor in the channel in $3\frac{1}{4}$ fathoms. This position places the vessel out of the influence of the south channel running to the Chehalis (1862).

The anchorage under point Brown is not only uncomfortable but unsafe to a vessel without heavy ground tackle. At this point there is no protection against the full sweep of the heavy summer winds, which, blowing at times counter to the strong currents in the bay, cause a very disagreeable, short sea. Another circumstance tends to render this anchorage unsafe: between point Hanson and Eld island lies the Middle shoal, which, being bare at low water, confines the waters to a narrow regular channel; but when the tide rises sufficiently to cover this shoal the conflicting currents cause a heavy overfall, especially on the large tides, strong enough to tear a vessel from her anchors. This happened to the surveying brig in May 1860.

The peninsula terminated by point Brown, is about a mile in breadth and $4\frac{1}{4}$ miles long; its general direction is S.E. by S. The bay shore is covered with fir. The outer shore is the commencement of a sand waste, stretching toward the Copalis river. Between the timber and this waste is a large pond or lagoon, and outside that the sand is covered with coarse beach grass and stunted lupine bushes, and cut up with the tracks of bears, cougars, wolves, elk, &c. From the north end of Eld island a body of water stretches into the sand waste parallel with and near the ocean beach for about a mile. Close under the bay shore of this peninsula runs a narrow crooked channel, which Whidbey surveyed in 1792 for 2 miles, and in which he gives 4 fathoms.

From point Hanson the mouth of the Chehalis river bears N. 52° E., distant 12 miles; and this course is the general direction of the south-east side of the bay, except the indentation forming South bay. The first bluff inside the point is named Stearns. Around the south-west side of this bluff comes John river. Within $1\frac{1}{4}$ miles of the mouth of the Chehalis the Neuskah' enters, coming from the south-east.

From point Brown point New lies N. 89° E., distant 4½ miles; off it are two rocks, named Ned rocks.

Brackenridge bluff commences about ¾ of a mile east of point New, and extends 8 miles eastward to the low land bordering the Hoquiamts river. From point New the shore-line runs nearly straight to the Chehalis, distant 8 miles, and the point of Stearns bluff lies S. 48° E., distant 4½ miles.

To the N.N.W. of the line joining points New and Brown lies North bay, consisting of an immense mud flat, bare at low water, and having an area of 22 square miles. At the head of it lies Saddle hill. In the stretch of 4 miles north-west of point New are three small streams, called the Typso, Chinois, and Humtolapy, emptying into North bay. They work narrow crooked channels through the mud flats, but at low water there is not sufficient depth to carry a whale-boat through them.

By measurement it has been found that more than nine-tenths of Gray harbour is bare at low water. Inside of the entrance the area of the surface of the water, bounded by the flats, bare at low tide, is only 4½ square miles. This will give a fair idea of the limited extent of the harbour. Through the flats lying between this available space and the Chehalis run two contracted channels. The northern commences at a point 2 miles N. 67° E. from point Brown, is the only available one, and would require buoying out for its entire length. For about 6 miles it is ¾ of a mile wide, with a depth of 4 fathoms. The south channel commences just inside point Hanson, and is very contracted and shallow. The flats are so extensive, and the mud so soft in places, that it is impossible to reach the shore, except at high tides. This fact has retarded the development of the trade in lumber, although the shores are heavily timbered.

The Chehalis river has been navigated by a small steam-boat for 20 miles, to the mouth of the Latsop, which comes from the northward. This is the head of the tide-water; but enterprise would render the river navigable much higher. Boats have come from the bend of the Chehalis, at the mouth of the Skookumchuck, near the road passing from the Cowlitz river to Puget sound. The country behind the bay appears low and flat, and well watered by the Chehalis and tributaries, which drain a section well timbered and dotted with many small prairies and bottom lands.

In the winter of 1852—53 the brig *Willimantic* was driven ashore upon Eld island, having mistaken this for Shoalwater bay. After vainly attempting to launch her toward the sea she was dragged across the island and launched on the bay side. Then the island was a mere bank of sand, bare at all tides, and covered with logs and drift-wood.

Copalis River.—From point Brown the shore-line trends about N.N.W. for 10 miles to the mouth of the Copalis. The barren waste of point Brown continues along this shore, commencing with a breadth of over 1 mile, stretching from the ocean to a dense forest of fir, and growing narrower as it approaches the Copalis, where the timber comes to the water's edge.

This stream is about 100 yards wide, but the mouth is almost closed by a bar. Upon its banks reside the Copalis tribe of Indians, from whom the river derives its name. Like all the streams on this coast it abounds in salmon, but those caught here are celebrated for their richness of flavour. Their general appearance is similar to those of Columbia river, but this variety rarely exceeds 2 feet in length. They weigh from 5 to 10 lbs.

In or about October 1854, there was discovered 1 mile north of the Copalis

the whole stern frame of the *General Warren*, which had been wrecked on Clatsop spit, at the mouth of the Columbia river, more than two years previously, having thus been carried by currents at least 60 miles from its original position. When the hydrographic survey of the entrance to the Columbia was made by the Coast Survey parties in 1852 this wreck was found and its position determined. From cape Hancock it bore S.E. by E. almost 4 miles distant, and was consequently little more than a mile from point Adams. It then rested on the north edge of the Clatsop spit. This shows a direction of the current, corroborating Vancouver's account when anchored off Destruction island, and agreeing with our experience.

Point Grenville.—From the Copalis river to this point the shore runs N.W. $\frac{1}{2}$ N. about 16 miles, and continues low, nearly straight, and bordered by sand beach, which changes to shingle, disposed in long rows parallel with the coast. These ridges of shingle dam the mouths of many small streams and form ponds, abounding in trout, and well stocked with beaver and otter, according to the accounts of the Indians. The high land also approaches much nearer the beach, and forms sandstone cliffs, with rocky ledges projecting into the ocean.

Point Grenville is a bluff, rocky promontory, stretching westward about a mile, and then southward about a $\frac{1}{2}$ of a mile, forming a very contracted and exposed roadstead; with the 8-fathom curve extending $\frac{1}{2}$ a mile from the beach, compelling vessels, except of very light draught, to anchor so far out that the point and the rocks off it afford but little protection from the north-west winds. It is useless during the winter months. The point has high hills lying behind it, and many rocks immediately off it; two of these rocks, about 75 feet high, lie E. by S. 400 yards distant; another lies S.W. $\frac{3}{4}$ S. $\frac{1}{4}$ a mile distant,—this has a depth of 5 and 6 fathoms all around it, and, we believe, is the one that shows a large perforation through it when viewed from the south-east or north-west. Other rocks stretch along the coast to the north-west, one of them showing from the south as a leg-of-mutton sail. The bluff itself is composed of fine sandstone, is very steep, and may be ascended by a difficult trail, which is used by the Indians. It is said to be a great resort for sea otters, which are hunted by the natives. Its approximate geographical position is lat. $47^{\circ} 20'$, long. $124^{\circ} 14'$. From cape Hancock light it bears N.W. by N. $\frac{1}{4}$ N., distant 62 miles, and from the cape soundings may be had in from 8 to 15 fathoms, 8 or 4 miles from the shore.

North of point Grenville to cape Classet the shore is bold and rocky, with occasional short reaches of sand beach. The timber comes down to the water; moderately high hills approach the coast, through which empty numerous small streams, whilst the irregular Olympus range looms up far in the interior. In winter these mountains are covered with snow, which lies in the gorges and valleys nearly the whole summer. Mount Olympus, the highest peak of the range, attains an elevation of 8198 feet, according to determinations made in 1841 by the United States Exploring Expedition.

From point Grenville, the coast begins to increase gradually in height. The shores, in passing, will be observed to differ in some respects from those southward of it. They are composed of low cliffs rising perpendicularly from a beach of sand or small stones, with many detached rocks of various remarkable forms lying at the distance of about a mile from them. The soundings are regular of from 16 to 19 fathoms, soft sandy bottom.

Along this part of the coast there appears to be a current setting northward

at an uniform rate of nearly $\frac{1}{2}$ a league per hour, as Vancouver remarks, that after passing cape Orford he was carried northward more rapidly by 10 or 12 miles per day than he expected. He also observes that in the vicinity of Destruction island, the strong current or tide set him in-shore, so that he was obliged to anchor in a depth of 21 fathoms, on a bottom of soft sand and mud, at about $8\frac{1}{2}$ miles S.S.W. from the island. This in-shore set of the current was also experienced by Commander Wilkes, U.S.N., in 1841.

The coast from Destruction island continues to increase in height to the northward. Off it are many rocky islets and sunken rocks, extending in some places a league from the shore. Soon after passing the outermost of these rocks cape Classet, the south point of the entrance of Juan de Fuca strait, may be plainly distinguished.

Quénuitl river.—The mouth of this small stream is between 3 and 4 miles N.W. by W. from point Grenville, and is almost closed by the shingle and gravel thrown up by the surf; there is, however, a contracted opening for the passage of canoes in calm weather. The closing of the entrance has so dammed the river as to form a small lake inside, upon the banks of which is situated a village of the Quénuitls, a race of Indians hostile to all other tribes. Combined with other Indians to the northward they have ever been notorious for their hostility and vindictiveness to the whites. Several Spanish, English, and Russian vessels and their crews were, in former times, taken and destroyed. Hence we meet with the names Destruction island, Isla de Dolores, Punta de Martires, &c., in this immediate vicinity. The river is said to flow from a lake at the foot of the mountains.*

For 4 miles above the Quénuitl the coast trends in the same direction, N.W. by W., is composed of sandstone cliffs, and bounded by many precipitous rocks, the height and direction of which are generally that of the cliff. In the Coast Survey reconnaissance of 1852, one is placed $2\frac{1}{2}$ miles off shore in latitude $47^{\circ} 27'$, and the vessel's track is laid down inside of it. A great many large rocky islets lie close in shore in this vicinity, but northward the coast is nearly clear to Destruction island. It makes a slight curve eastward, and alternates with bold yellow cliffs and low shores.

Destruction Island.—This island is the only one on the coast deserving the appellation after leaving the Farallones, off the bay of San Francisco. It is about 150 feet high, quite flat on the top, covered with grass, but destitute of trees, and has high perpendicular sides of the same height as the cliffs on the main. It is said that there are some remarkable perforations through a rock near it, but these are doubtless, only seen in particular directions, for, in passing close to it, the surveyors did not observe them. On the eastern end were formerly some rude Indian huts. In Vancouver's time two or three dwarf trees grew at either end.

When running along the coast, 10 miles off, it is very difficult to distinguish

* The name of this river is usually known by the old settlers as Qué-noith, but the Indians are said to pronounce it as if spelled Qué-ni-ñtl, accenting the first syllable strongly, and the last so softly that many persons consider they call themselves simply Que-nai. A tribe still further north is called the Que-nait'-sath. The Mukkaws call it the Quin-aitl. De Moiras calls it "Kiniat."

These Indians, when travelling by canoes along the low sandy beach south of point Grenville, push out into the rollers, keep between the line of two seas that have broken, and pole the canoe through the surf. This peculiar mode is rather apt to excite the fears of those ignorant of what a canoe can be made to do when skillfully handled.

this island, because, being within $1\frac{1}{2}$ miles of the main, it is projected against the coast cliffs and cannot be distinguished from them until close upon it. It is narrow, but about $1\frac{1}{2}$ miles long in a N.N.W. direction, running parallel with the coast, and has rocks for a mile off its southern end. A reef and sand bank is represented as stretching thence W.N.W. 8 miles to broken water, and from thence running nearly straight to the northern end. It is probable that a detailed examination of this locality might discover that good refuge could be had under the island during heavy south-east and south-west weather. No winter harbour of refuge exists between point Reyes and Neé-ah bay, unless this be such, in which case it is of very great importance.

Between the island and the main the soundings range from 7 to 12 fathoms, and northward of it from 10 to 14 fathoms. The approximate geographical position of the north end is lat. $47^{\circ} 41'$, long. $124^{\circ} 25'$. From cape Hancock it bears N.W. by N. 84 miles.*

Vancouver in his voyage northward observes "soon after passing Destruction island, the most remarkable mountain on the coast presented itself. Its summit, covered with eternal snow, was divided into a very elegant double fork, and rose conspicuously from a base of lofty mountains clothed in the same manner, which descended gradually to hills of a moderate height, and terminated in low cliffs falling perpendicularly on a sandy beach; off which were scattered many rocks and rocky islets of various forms and sizes. This was generally considered, though it was not confirmed by its latitude, to be the mount Olympus of Meares; it being the only conspicuous mountain we had observed on the part of the coast we had visited."

In June 1855, the surveyors discovered in the direction of W. by N., distant 16 miles from point Grenville, "a bank having 15 fathoms upon it, with very soft mud bottom; at 21 miles distance, 17 fathoms; and at 29 miles, 86 fathoms; and 8 miles S.S.E. of the first position we struck $16\frac{1}{2}$ fathoms, with the same bottom, in all the soundings; but had not time to make an extended examination. In April 1856, we found 45 fathoms in lat. $46^{\circ} 54'$, long. $125^{\circ} 8'$, being 16 miles broad off shore. The soundings of 17, 18, and 19 fathoms, 1 mile from shore, would indicate a greater depth than we obtained. Vancouver has 50 fathoms inside of our first soundings."

From Destruction island northward the shore is composed of cliffs which form a regular curve to a point-bearing N.W. $\frac{1}{2}$ W. from the north end of the island, and 11 miles distant; thence the shore runs nearly straight on that course for 10 miles to two high, abrupt, and well marked rocks, standing a mile from shore. The outer one is bold and covered with tall trees, but the inner one is bare. They are in lat. $47^{\circ} 58'$, long. $124^{\circ} 40'$. Many others, but smaller, lie inside of them, and 19 fathoms are found close outside. Along this stretch the shore is irregular and bluff, with many high rocky islets off it. A stream opens about midway in the stretch.

In the indentation northward of Destruction island, and about 4 miles from it, empties a small stream, which we believe is called Hooch by the Indians.†

* This island is called Isla de Dolores upon old Spanish maps. It received its present name, (by which only it is known on the coast), in 1787, from Captain Berkely, who sent a long-boat from King George sound to explore as far south as latitude 47° . The crew of a smaller boat entered a shallow river and rowed up some distance, where they were attacked and murdered by the Indians.

† Meares calls the curve of the coast, about Destruction island, "Queenhythe bay," evidently a corruption of the Que-ni-utl, or Que'-noith.

Flattery Rocks.—From the two rocks just mentioned to cape Classet, in lat. $48^{\circ} 28'$, the course is almost N.N.W., passing through a group of high, well-marked, rocky islets, in lat. $48^{\circ} 12'$, named the "Flattery rocks." Before reaching these the coast-line curves about a mile eastward, with a bluff shore nearly free from rocks for about 8 miles, when a large white rock $\frac{1}{4}$ a mile out looms up prominently, and is distinctly seen against the main land.

Flattery rocks extend between 2 or 3 miles from shore; the outer ledge is awash with one islet in it, and the track of the coast surveying steamer is laid down inside of it, with soundings in 9 to 20 fathoms. High abrupt timbered islets lie inside, with their ocean faces nearly perpendicular, about 150 feet high, and sloping landward. Where destitute of trees, these are covered with grass, bushes, &c. The latitude of the rocks is $48^{\circ} 12'$.

From Flattery rocks a high rocky coast, bordered by outlying rocks continues for 8 miles, when a low sand beach occurs, receiving a small stream which runs E.N.E. and finally North, behind the mountain constituting cape Classet, to within 200 yards of the beach in Neé-ah bay. A rise of 20 or 30 feet of the sea would make cape Classet an island, extending 5 miles W.N.W. by 8 miles in breadth. This creek is used by the outer coast Indians during the prevalence of heavy winter gales, when the passage outside the cape would be impracticable.

From point Grenville to cape Classet the hills rising from the coast are about 2000 feet high, densely covered with trees, and cut up by innumerable valleys. The shore is inhabited by numerous tribes of Indians, accustomed to war and bitterly hostile to the whites.*

Tatoosh Island.—This island lies W.N.W. $\frac{1}{4}$ a mile from the point of cape Classet. It is composed of small islets connected by reefs, is quite flat-topped, and without trees. The surface is 108 feet above high water, and the sides are perpendicular; the entire mass is composed of course sandstone conglomerate with an out-crop of basalt on one of the reefs. There is a depth of 2 or 3 feet of soil upon the top, which was formerly cultivated by the Indians, who resorted here in summer, about 150 strong, and had several houses near the only boat landing on the inside of the island, (1852). A reef extends $\frac{1}{4}$ of a mile off the west side of the island, and the whole extent of the island and reef is only $\frac{1}{4}$ a mile W.N.W. by $\frac{1}{4}$ of a mile. Deep water is found upon all sides, except between it and the cape, where a reef exists upon which it breaks very heavily in bad weather. It has been asserted that small vessels have gone through this channel when jammed by an unfavourable wind;—in so doing great risk must have been incurred, as the currents in the vicinity run very irregularly and strong.

From the top of the island a leaning rocky column, about 75 feet high and one-third of that in diameter, is seen to the south-eastward close under the face of the cape. It is sometimes called Fuca's pillar.

The lighthouse standing on the highest part of the island, consists of a

* These Indians are far superior to those found along the coast to the southward. Their villages are heavily stockaded, and the houses made of cedar boards, which they have cut with great industry from the tree; some of these boards are over 4 feet wide and 20 feet long;—the outside edges being about an inch thick and 3 inches in the middle. Their houses are very large, and partitioned off into stalls for each family. The numerous streams emptying upon the coast afford them a never failing supply of the finest salmon; and to obtain means of barter with white traders they fearlessly attack and capture the different species of whale on the coast.

keeper's dwelling of stone, with a tower of brick, whitewashed, rising above it, and surmounted by an iron lantern painted red, its height being 66 feet above the top of the island. The light is *fixed*; it is 162 feet above the sea, and in clear weather can be seen from the distance of 90 miles. Its geographical position as determined by the Coast Survey, is lat. $48^{\circ} 28' 20''$, long. $124^{\circ} 48' 48''$. The arc of illumination seaward from the lighthouse, starting from the land southward, is 268° , hence it is also a useful guide to vessels in Juan de Fuca strait.

Duncan Rock.—This is a small, low, black rock rising above the highest tides, but always washed by the western swell, which breaks over it. Deep water is found close around it. From Tatoosh island light it bears N. 38° W., distant 2078 yards, or more than a mile, and many vessels pass between them, as the chart shows 25 to 40 fathoms; but a rock having been reported in about midway, it would be prudent to avoid this channel until the doubt is set at rest. Vancouver's vessels passed between them.

During a three months' stay at Née-ah harbour in 1852, the surveyors tried upon several occasions to land upon this rock with canoes, but without success.

Duntze Rock.—At nearly a $\frac{1}{4}$ of a mile N.W. by N. from Duncan rock, and consequently with that rock in one with Tatoosh island, is Duntze rock, upon which is a depth of 3 fathoms. The sea usually breaks upon it with great violence. Close to the north side of this rock is deep water, of 60 to 100 fathoms.

Mr. G. J. Gibbon, R.N., when alluding to the supposed existence of this 8-fathom patch, says:—"From the whirling and broken water extending from the Duncan rock, in a N.W. direction, fully $\frac{1}{4}$ a mile, I am led to suspect the existence of a dangerous reef of rocks, and as the tide here trends southward of West, and runs at the rate of 3 to 5 miles an hour, influenced by the state of the weather, the force and direction of the wind, I recommend all strangers bound into or out of the strait, to keep northward of the stream of it, until at least 4 or 5 miles east or west of its meridian; nor do I consider it advisable ever to pass between the Duncan rock and Tatoosh island unless bound into or out of Née-ah bay, and then only with a good commanding breeze."

With no wind, a heavy swell from the west, ebb current, and proximity to these outlying rocks and island, a vessel's position is unsafe, and great caution should be exercised in navigating this part of the entrance to the strait of Fuca.

CAPE CLASSET.—This cape forms the southern head of the entrance of the strait of Juan de Fuca; it has a bold, wild, jagged sea-face, about 100

* So named by Vancouver in 1792, probably from the tribe of Indians, or chief of the tribe inhabiting that region, and by this name British geographers usually recognise it; but in the American coast survey charts it is called cape Flattery, Captain Cook having given it the latter name in 1778. Mr. Davidson U.S. Coast Survey says—"In March 1778, Cook, having been driven seaward by heavy gales off cape Perpetua, made the land about the latitude of $47^{\circ} 35'$, and 4 leagues from shore, as he says, when he was in hopes of finding a harbour to the northward under a small round hill which appeared to be an island, but on approaching it he became almost convinced that the opening was closed by low lands, and being thus disappointed, he named the point of land to the north of it cape Flattery, and placed it in latitude $48^{\circ} 15'$. On recent English charts the cape is placed in the position of the Flattery rocks, although Vancouver adopted the present usage on this coast. From an examination of Cook's account, with a knowledge of the coast and the currents here, we are satisfied that he was further north than he estimated on the morning of March 22nd, for he says the small round hill like an island bore N. $\frac{1}{4}$ E., (*true*), distant 6 or 7 leagues, while the coast extended from N. to S.E., (*true*). These facts convince us that his position was in lat. $47^{\circ} 50'$, long. $124^{\circ} 46'$; from this situation the Flattery rocks are distant 7 leagues, bearing N. $\frac{1}{4}$ E., (*true*); the extremity of cape Flattery (Claslet) bearing

feet high, much disintegrated by the wearing action of the ocean; rises in a mile to an irregular hill of 1500 or 2000 feet in height; is cut up by gorges and covered with a dense growth of fir and almost impenetrable underbush from the edge of the cliffs to the summit. The shore-line round to Neé-ah bay is of the same forbidding character, bordered by reefs, and having but one short stretch of beach at the foot of the hills. Upon this beach is situated (or was in 1852) Clisseet village. The soundings $\frac{1}{2}$ a mile from shore are deep and irregular, reaching 68 fathoms. The current runs as much as 8 miles per hour, and during the ebb sets irregularly round the cape, Tatoosh island, and Duncan rock. When seen from south-westward cape Classet looks like an island, on account of the valley 3 or 4 miles eastward of it. The best position for seeing this is when a single rock off the cape shows itself detached. From this direction the high mountains on Vancouver island loom up and stretch far away to the north-west and to the east.

At the entrance to the strait of Juan de Fuca, 15 miles (by estimation) W.N.W. from cape Classet, is said to be a bank having 18 fathoms upon it, which is much frequented by codfish. When the surveyors were encamped in Neé-ah bay, in 1852, the Indians frequently went out upon some bank off the strait to fish for cod, but their assertions were looked upon with distrust, as it was believed that they caught the fish inside of the strait. Circumstances have hitherto prevented an examination of this bank.

STRAIT OF JUAN DE FUCA.

Juan de Fuca strait has its entrance between latitudes $48^{\circ} 28'$ and $48^{\circ} 36'$, on the meridian of $124^{\circ} 45'$. It runs eastward as far as long. $122^{\circ} 45'$, or as far as the west coast of Whidbey island. Its geographical position makes it liable to all those sudden vicissitudes of weather common to high northern latitudes; and in few parts of the world is the caution and vigilance of the navigator more called into action than when entering it.

The breadth of the strait between cape Classet or Flattery, its southern point, and Bonilla point, (Vancouver island) its northern, is 18 miles; within these points it soon narrows to 11 miles, and carries this breadth on an East course for 40 miles, or until Race islands bear N.E. by E., distant 10 miles; it then takes an E.N.E. direction for a farther distance of 14 miles to the shore of the continent, or more properly Whidbey island.

Between Race islands and the southern shore the breadth of the strait is 8 miles, after which it immediately expands to 17 miles, leading northwards

nearly N., (*true*); the distance to the nearest point of land a little more than 3 leagues; and the coast northward of point Grenville bearing S.E., (*true*). The point of land northward of the Flattery rocks was, therefore, his cape Flattery, and his estimated latitude of it 8 miles too small. Before next day he had a very hard gale from the S.W., accompanied with rain, and he did not see land again until he reached latitude $49^{\circ} 15'$. He arrived at the conclusion that between 47° and 48° there existed no inlet, as had been asserted." There appear from these remarks to be good reasons for retaining the name as given by Captain Cook, but from the circumstance of its being better known by shipmasters as cape Classet we have adopted this in preference.

to the British possessions by various channels among the labyrinth of islands known as the Haro archipelago, and southward to those of the United States, by Admiralty inlet and Puget sound.

The coasts of Juan de Fuca strait are bold, abrupt, and covered with a heavy growth of varied timber and dense underbush. They are remarkably free from danger, and may be approached safely within $\frac{1}{2}$ a mile; there is one breaking rock which lies nearly that distance off the west point of Crescent bay on the southern shore.* The soundings in the centre are of great depth, no bottom being found in its deepest parts with 150 fathoms of line; but within $1\frac{1}{2}$ miles of either shore there is generally under 40 fathoms, and on the northern side when 5 miles eastward of port San Juan, 8 to 12 fathoms will be found within a mile of the shore, and, if necessary, vessels may anchor. On both sides of the strait there are several anchorages or stopping places which may be taken advantage of by vessels, either inward or outward bound when meeting with adverse winds;—those on the southern side are Nee-ah and Callam bays, port Angelos, and New Dungeness bay, all westward of the harbours of Admiralty inlet; on the northern side are port San Juan, Sooke inlet, and Becher bay all westward of the Race islands, eastward of which excellent anchorage may be always obtained with westerly winds.

On the northern or Vancouver island shore of the strait the hills rise gradually and are densely wooded, but near the coast attain to no great elevation. On the southern side the almost perpetually snow-clad mountains known as the Olympian range, rise more abruptly and vary in elevation from 4000 to more than 7000 feet; but though exceedingly grand in their rugged outline, present no very marked summits as seen from the strait nor any great variety in their features;—on this shore a steep cliffy coast commences at 80 miles from cape Classet and continues for about 50 miles,—it is 50 to 200 feet high, and a flat country behind extends nearly to the base of the Olympian range and stretches further southward as the eastern part of the strait is approached. On the east the face of Whidbey island is very steep; it is about 250 feet high and appears flat, as does the whole country eastward to the sharp-cut outline of the Cascade range, stretching its serrated ridge northward, where the snow-peak of mount Baker is distinctly seen, and to the southward, where the higher peak of mount Rainier attracts the eye,—this mountain is believed to be more than 15,000 feet high.

Tides.—It is high water, full and change, at cape Classet at noon and at midnight; the ebb stream there commences to run strong at 2h. A.M. and P.M. and continues for about 6 hours.

In the outer part of Juan de Fuca strait there is no very great strength of tide; it varies from 1 to 4 knots, seldom so much as the latter unless near cape Classet; but when approaching the more contracted part in the neighbourhood of the Race islands, which receives the first rush of the pent up waters of the strait of Georgia, strengthened and diverted by the labyrinth of islands which choke up its southern entrance, it is not surprising that eddies, races, and irregularities occur which almost baffle any attempt at framing laws

* It may be here remarked that almost all the rocky shoals and dangers in these latitudes are well marked by kelp; indeed the kelp line, to a stranger, is in every instance the danger line, and should be avoided, for though it will sometimes show in a depth of even 40 fathoms, it is always indicative of the presence of rocks, and should not be ventured into unless it has been well ascertained to be free from sunken dangers.

which may not rather embarrass than assist the seamen; the result, however, of observations continued throughout an entire year at Esquimalt, and partially on other parts of the coast during three seasons, appears to warrant the following conclusions, viz. :—

The flood tide sets to the northward along the outer coast of the continent and Vancouver island. It enters the strait of Fuca at cape Classet, running with considerable velocity, sometimes 3 or 4 knots over Duncan and Duntze rock; it then turns sharply into the strait, passing through the various channels among the Haro archipelago into the strait of Georgia, and within about 5 miles of cape Mudge, where it is met by a flood from the northward, which, sweeping the western coast of Vancouver island, enters Goletas channel and Queen Charlotte sound at its northern extreme, in lat. 51° , thence southerly down the narrow waters of Johnstone strait and Discovery passage, meeting the tide which enters by Fuca strait, and reaches about midway between the northern and southern extremes of Vancouver island, or close to the spot where the broad expanse of the strait of Georgia merges into the narrow channels adjoining it.

On the western side of the island the tides were found to be regular—flood and ebb of 6 hours' duration, the times of high water on the full and change at Nootka sound, and at the entrance of Goletas channel varying very little, and occurring near noon, the greatest range 13 feet; nor is any marked irregularity observable in Johnstone strait and Discovery passage, except the not unusual circumstance that the ebb stream continues to run to the northward for 2 hours after it is low water by the shore, the water rising at the same time, the ebb stream being of 7 hours' duration, the flood about 5 hours.

The great and perplexing tidal irregularities may therefore be said to be embraced between the strait of Juan de Fuca, near the Race islands, and cape Mudge, a distance of 150 miles; and a careful investigation of the observations made at Esquimalt, and among the islands of the Haro archipelago, shows that during the summer months, May, June, and July, there occurs but one high and one low water during the 24 hours, high water at the full and change of the moon happening about midnight, and varying but slightly from that hour during any day of the three months; the springs range from 8 to 10 feet, the neaps from 4 to 5 feet. The tides are almost stationary for 2 hours on either side of high or low water, unless affected by strong winds outside.

During August, September, and October, there are two high and low waters in the 24 hours; a superior and an inferior tide, the high water of the superior varying between 1h. and 3h. A.M., the range during these months from 8 to 5 feet, the night tide the highest.

During winter almost a reversal of these rules appears to take place; thus, in November, December, and January, the 12-hour tides again occur, but the time of high water is at or about noon instead of midnight.

In February, March, and April, there are two tides, the superior high water occurring from 1h. to 3h. P.M. Thus it may be said that in summer months the water is low during the day, and in winter low during the night.

The ebb stream has always been found to run southward through the Haro archipelago, and out of Fuca strait for $2\frac{1}{2}$ hours after it is low water by the shore, the water rising during that time; the ebb is stronger than the flood, and generally two hours' longer duration.

The tides during those months when two high and two low waters occur in the 24 hours, are far more irregular than when there is only one 12-hour tide, and another anomaly exists, viz., the greatest range not unfrequently occurs at the first and last quarters, instead of at the full and change of the moon.

Currents.—A southerly current has been found to prevail on the western coast of Vancouver island more or less throughout the year, particularly from August to November, probably in some measure caused by the N.W. winds which blow constantly during the summer. This current joining the ebb tide out of Fuca strait has been known to set vessels between 4 and 5 miles an hour to the southward, and during fogs there is great risk of being drifted on to cape Classet, or some of its off-lying dangers; extreme caution should therefore be observed in entering the strait at such times, especially near the full and change of the moon, when the tides are at their strongest.

Winds.—Within the strait of Juan de Fuca, in the winter season, the winds usually assume its direction either up or down. During summer, the prevailing winds from N.W. or S.W., take a westerly direction within the strait; while the S.E. gales of winter blow fairly out.

Although a westerly wind may be blowing within the strait, it frequently during the change of the seasons blows heavily outside at the same time from S.S.W., or sometimes suddenly changes to that direction, from a light easterly wind on opening the entrance, which makes that part of the coast of Vancouver island between port San Juan and Bonilla point a dangerous lee-shore to a ship without steam power.

The coast winds in summer prevail from S.W. and N.W., the former during the early months, and the latter blow fresh and with great regularity during June, July, and August. In September and the early part of October the winds are very uncertain and there is generally a great deal of calm, gloomy weather.

The barometer usually stands above 30.00 inches during summer; should it fall to 29.90 a south easterly wind with thick rainy weather may be expected, but of short duration and clearing up with a westerly wind as soon as the barometer rises.

The winter winds are S.E. or S.W., more frequently the former; they set in towards the end of October, and continue until the middle of April. S.E. gales are generally preceded by a short interval of calm, cloudy weather; they spring up gradually from East or E.S.E. veering to the southward, accompanied by rain and thick weather, the barometer falling rapidly; when the barometer becomes stationary the wind shifts suddenly to S.W. and blows heavily with clear weather, but frequent squalls of rain; the barometer begins to rise immediately the wind veers to S.W., from which quarter it generally blows from 12 to 20 hours.

The violence and duration of these S.E. gales is always proportioned to the fall of the mercury; with the barometer at 29.50 a strong gale may be looked for from this quarter; it seldom falls below 29.20, when very bad weather is certain to follow. On two or three occasions in as many years it has been known to fall to 28.90, and has been followed by S.E. gales of great violence.

A S.E. gale sometimes springs up, though very seldom, with the barometer above 30.00 inches. On such occasions the wind has always been preceded by calm, cloudy weather and rain, with a high but falling barometer; such gales are not violent and of short duration.

S.E. gales are always accompanied by thick dirty weather, and rain; they seldom continue from that quarter for more than 12 or 18 hours, unless the barometer falls very low, and almost always shift to S.W.

When the S.W. gale of winter is not preceded by the south-eastern, the barometer seldom falls; it either remains stationary, when the gale may be expected to continue longer, or rises slowly, when it will gradually subside and fine weather follow. S.W. gales are accompanied by heavy banks of clouds, and passing showers of rain, sometimes snow.

The barometer has been known to fall during winter as low as 29.45 and has been followed by no gale or bad weather, but on such occasions there has been a heavy fall of snow on the hills, and a sudden fall of 15 degrees in the temperature.

A fine northerly or N.E. wind frequently occurs at intervals during the months of December, January, and February; it is always accompanied by a high barometer above 30.0, and at such times a continuance for several days together of clear, cold, frosty weather may be looked for; the barometer on these occasions will sometimes rise as high as 30.70, and the fine weather will then probably last a fortnight or more.

Fogs.—Although fogs in this region are not nearly of such frequent occurrence as on the neighbouring coast of California, where they prevail almost uninterruptedly during summer and as late as the middle of October, yet from August to November they occasionally occur in Juan de Fuca strait, and are sometimes very dense over the entrance for several days together. They are generally accompanied by calms or very light winds from N.W., which renders them more dangerous to sailing vessels closing the land.

Soundings.—Between the parallels of 48° and 49° the 100 fathom bank extends for 32 miles off shore, and for 5 or 6 miles on either side of the parallel of 48° 30', which passes through the centre of Juan de Fuca strait, no greater depth than 55 fathoms is found at the distance of 40 miles from the entrance. Steering for the strait within these limits of latitude, viz. a few miles on either side of 48° 30', from 55 to 60 fathoms will be carried for 20 miles, the bottom fine dark sand, sometimes varied by gravel and small stones, when it will deepen to 80 and 90 fathoms, generally muddy bottom, for a farther distance of 10 miles; a vessel will then be within 8 or 10 miles of the strait: if to the northward of 48° 30' the water should shoal to 36 and 40 fathoms rocky or gravel bottom; if to the southward it will continue deep and will increase to more than 100 fathoms, when within 8 or 9 miles of cape Classet.

The outer edge of the bank is rather steep, falling from 90 to 150 fathoms and then no bottom with the ordinary line. There is one peculiarity which should not pass unnoticed; the deep channel of over 100 fathoms, which runs through the centre of the strait, on entering the ocean is deflected to the southward, probably owing to the superior strength of the ebb stream and the southerly current, and a zone of deep water about 8 miles in width, with from 140 to 150 fathoms, extends in that direction to the 48° parallel; between it and the shore, a distance of about 8 miles, the depth decreases suddenly to 30 fathoms fine dark sand, and immediately outside it from 67 to 80 fathoms will be found.

Mr. Davidson U.S. Coast Survey says, 1862,—“At the time of our first visit the southern shore of the strait of Juan de Fuca was inhabited by large numbers of Indians, living in heavily stockaded villages. They were tolerably

expert in the use of fire-arms, of which they seemed to have a good supply. They lived mostly by fishing, but raised a fair supply of remarkably good potatoes from the stock seed of the Hudson Bay Company.

During dry summers the Indians and settlers set fire to the forests in every direction, and the country soon becomes enveloped in a vast smoke that lasts for two or three months. At such times it is frequently impossible to make out the shore at $\frac{1}{4}$ a mile distance. The strong westerly winds coming up the strait disperse it for awhile, but only to fan the fires and give them renewed force and activity.

In summer the prevailing wind draws into the strait, increasing towards evening, and frequently blowing a 10-knot breeze before midnight; but unless the wind is strong outside little is felt in the strait, and very frequently vessels are a week from cape Classet to Admiralty inlet, or *vice versa*. In winter the south-east winds draw directly out, and create a very heavy cross sea off the entrance, the great south-west swell meeting that rolling out. In such cases trading vessels try to gain Neé-ah bay or San Juan harbour, and remain at anchor until the wind changes. In beating in or out vessels may run as close under either shore as wind and currents warrant, as no hidden dangers have been found $\frac{1}{2}$ a mile off shore, except at the west side of the small indentation called Crescent bay, near Striped peak, 44 miles inside of Duncan rock.

At the entrance the currents acquire, during the 'large tide' of each day, a velocity of 4 miles per hour, and after strong north-west winds, a very large, short, but regular swell is encountered west of Neé-ah bay during the ebb current. If the wind is light, and no steerage way on the vessel, the feeling is decidedly disagreeable, especially as the current seems constantly to set close around Duncan rock and Tatoosh island. If a vessel falls into the trough of this swell she is bound to fetch away something.

Settlers are gradually advancing from Puget sound and Admiralty inlet along the strait westward, and are destined to meet those coming up the coast from Gray harbour and Shoalwater bay.

Washington Territory has a climate excelled only by that of California. We know not where to point to such a ramification of inland navigation, save in the British possessions to the northward. For depth of water, boldness of approaches, freedom from hidden dangers, and the immeasurable sea of gigantic timber coming down to the very shores, these waters are unsurpassed, unapproachable."

Directions.—Vessels from southward or westward bound for Fuca strait, except the coasting steamers which all carry pilots, should make cape Classet; there is no inducement to hug the coast, on which a long rolling swell frequently sets, and this swell meeting the south-easterly gales of winter, causes a confused sea. The cape and its off-lying rocks should not be approached within a distance of at least 3 miles as the tide occasionally sets over Duncan and Duntze rock with great velocity, an additional reason why these dangers should not be too closely approached. It is equally necessary either in entering or leaving the strait to avoid the coast of Vancouver island between port San Juan and Bonilla point, when there is any appearance of bad weather.

It is recommended to pass at the distance of at least 10 miles from the coast, unless working to windward against a fine northerly wind, which is frequently found during summer, when it may be safely approached within 3 miles or less.

To vessels making the strait in bad weather it will be more desirable to run in and seek shelter than to remain outside. If the land has been made either to the southward of cape Classet or on the Vancouver island shore within a moderate distance of the entrance, or if the latitude can be relied upon within 2 or 3 miles, it will be advisable to run for the strait. The powerful light on Tatoosh island (cape Classet) will, unless in very thick weather, or fog, be seen at a considerable distance, and as soon as a vessel is actually within the strait she will have comparatively smooth water, with sufficient sea room, and may run boldly up the centre for the light on Race islands, or by the assistance of that on Tatoosh island, maintain her position in the strait if preferred. It is to be remarked that when Tatoosh island light is brought to bear westward of W.S.W., it becomes shut in by the land about Nee-ah bay, and that the Race island light from a similar cause becomes obscured by Beechey head when brought to bear eastward of E. by N. $\frac{1}{2}$ N.; therefore, when either of these lights are obscured, the distance from either coast will be accurately judged, and in the latter case a ship will be getting too close to the northern shore.

Coming from westward with a heavy westerly or north-west gale, thick weather, and uncertain of the latitude, it would be prudent to lay by at not less than 80 miles from the entrance to the strait, or on the edge of the bank of soundings. These gales seldom last more than 12 hours, and if they veer towards the S.W. the weather will clear, and a vessel may immediately bear up for the strait.

With a S.E. gale it is recommended to close the land, smoother water will be obtained, and the bank of soundings off the Vancouver island shore will give a vessel pretty accurately her distance from the land. Gales from this quarter sometimes continue in the winter season for 30 hours, and when a vessel strikes soundings on the edge of the bank in 90 fathoms, and carries them in to 60 she may put her head to the S.W., and will have plenty of room for drift.

It is of great importance in making the strait during bad weather to strike the outer edge of the bank of soundings, as the ship's distance from the land will then be accurately known. It has been already observed that after running 20 miles eastward the depth increases from 55 to 80 and 90 fathoms, which latter depths, if the lead has not been previously kept going, might be mistaken for the outer edge.

Should a sailing vessel be overtaken by one of those dense fogs which sometimes hang over the entrance of the strait, she should not close the land but stand off sufficiently far to avoid being set by the southerly current too near cape Classet. If a steamer has made the land or light, and is certain of her position, she should get the northern or Vancouver island shore aboard, when, with the assistance of the chart and lead, she may feel her way in. When 8 or 10 miles eastward of port San Juan there is anchoring ground in 12 fathoms a mile from the shore, and if the fog is very dense a stranger should anchor; it must be remarked, however, that not unfrequently the weather is clear a few miles within the strait while the entrance is totally obscured.

SOUTHERN SHORE OF THE STRAIT.

NEE-AH BAY.—From the lighthouse on Tatoosh island the coast trends 4 miles E. by N. $\frac{1}{2}$ N. to Koitlah point, the western side of Nee-ah bay.

From cape Classet the shore is nearly straight, high, and rugged, backed by hills about 1500 or 2000 feet high, and covered with timber. Deep water is found within $\frac{1}{2}$ of a mile of the bluffs, and at a distance of $\frac{1}{2}$ a mile, a depth of 20 fathoms is obtained. Within a mile of Koitlah point was a large village of the Mukkaws, in 1852.

The bay is about $1\frac{1}{2}$ miles long S.S.E., and the same in width at the entrance. The western side is high, precipitous, and bordered by craggy out-cropping rocks 800 or 400 yards from the shore. The 8-fathom line ranges about 600 yards from the foot of the bluff. The general direction of this side is S.E. for 1 mile, when the hills suddenly cease, and a low shore, with sand beach backed by woods, curves gradually to the N.E. by E. for $1\frac{1}{2}$ miles to Ba-ad-dah point, formed by a spur of the hills.

The east side of the bay is formed by Waaddah island, the northern end of which lies $1\frac{1}{2}$ miles from Koitlah point in an E. by N. $\frac{1}{2}$ N. direction. This island is a narrow, high ridge, about 250 yards wide, and $\frac{1}{2}$ a mile long, covered with trees, and having a direction S.E. $\frac{1}{2}$ E., pointing towards Ba-ad-dah point, and presenting the appearance of a continuation of that spur, but separated from it by a 4-fathom channel 500 yards wide. Off the south-west part rocks extend for 250 yards, and the 3-fathom line is 600 yards distant. Along the sand beach the 3-fathom line is within 200 yards of the shore, the depth increasing to 7 fathoms, then decreasing to 5 in the middle of the bay, and again increasing to 10 on the outer line of the bay. Much kelp abounds in this harbour, even in deep water, the lower and thinnest portion being used by the Indians for fishing-lines. When coiled away and dry they break like grass, but soaking them in salt water renews their elasticity and strength.

The best anchorage is in the south part of the bay, in about 5 fathoms, being then off the small stream which comes in at the eastern foot of the hills. No direction can be given about anchoring off any particular village, as the Indians change their location so frequently; but near this stream will generally be found some houses, with an abundance of fresh water. During southerly weather little swell is felt here, and the wind can do no harm; but when a large westerly swell is coming up the strait it reaches here, and a vessel rolls uncomfortably unless she rides head to it.

The low ground abreast of the anchorage, and but 200 or 300 yards from the beach, is the head of a small stream that runs through the low prairie lands behind cape Classet, and empties into Nisco bay south of the cape, near a winter village of the Mukkaws, called Wa-atch. This stream is frequently used by them in winter, when they cannot take their canoes outside the cape.

Observations made behind the beach at about 400 yards eastward of the small stream before referred to, determined its geographical position to be lat. $48^{\circ} 21' 49''$, long. $124^{\circ} 37' 12''$. From the N.W. end of Waaddah island it bears S. by W. $\frac{1}{2}$ W., distant $1\frac{1}{2}$ miles.

"A good berth will be found in Nee-ah bay, in 6 fathoms sandy bottom, with the outer point of Waaddah island N.E. by N., and Koitlah point W. by N.; a short distance within this position kelp grows in large patches all over the bay, and some care is necessary in selecting a berth. Large sailing vessels may anchor in 7 or 8 fathoms a little outside the above bearings, in the centre of the bay, with the outer point of the island N.E. by E.

A vessel should leave this bay on any indication of a north-east wind, and if too late, and unable to weather Waaddah island she may, with the assistance of the chart, run between it and the main; the passage is 2 cables in

breadth, and the least water 21 feet; she must, however, be careful to avoid the ledge off the south-west end of Waaddah, and in hauling out should give the eastern side of the island a berth of at least a $\frac{1}{2}$ of a mile. Vessels have ridden out north-west gales close to the south-east end of Waaddah in 6 fathoms, but it is more prudent to get out into the strait at the commencement of the gale. During strong westerly or south-west gales, or after they have been blowing outside, a considerable swell rolls into the bay, which renders it at such times a somewhat disagreeable though not unsafe anchorage; small vessels may go close in and get smooth water, even among the kelp which grows in 4 and 5 fathoms."—*Vancouver Island Pilot*, 1864.

Tides.—The corrected establishment of the port is 12h. 38m. The mean rise and fall of tides is 5·6 feet; of spring tides 7·4 feet; and of neap tides 4·8 feet.

At about 2 miles eastward of Waaddah island, and within the limits of the kelp, is a rock 150 feet high, called Sail rock by the United States Exploring Expedition, and by Captain Kellett, R.N., Klaholoh (seals).^{*} The Indian name is Saelok. Behind it enters a small stream called Okho on the Admiralty charts, but this is not the Indian name.

CALLAM BAY.—From the eastern point of Neé-ah bay to Sekou point, the western part of Callam bay, the course is E. $\frac{1}{4}$ S., and distance 18 $\frac{1}{2}$ miles. The shore-line is nearly straight, bluff, and bordered by rocks, with an occasional stretch of sandy beach. At a mile off shore the average depth of water is 20 fathoms. The bay is at the western termination of a high, bold, wooded ridge, running parallel to the shore, with an almost perpendicular water face, and falling away rapidly in-shore. This easily recognised ridge is about 1000 feet high and 7 miles long;—its western extremity lies E. $\frac{1}{4}$ S. 16 miles from Waaddah island, and is called Slip point; its eastern is designated Pillar point. The width of the bay from Sekou point to Slip point is 2 miles, and the bearing E. by N. $\frac{1}{4}$ N. Outside these limits is a depth of 15 fathoms. The form of the bay is nearly semicircular, and the depth of the curve nearly a mile, with soundings of 6 fathoms in about the middle. Into it empties a small stream from the south-eastward, having low land on its eastern side, and a small rise on the west. Some sunken rocks are said to lie off Slip point.

Callam bay is quite open to all winds from northward and north-westward, and is consequently only safe during the prevalence of those from southward and south-eastward. The usual anchorage is in 8 to 6 fathoms. It must be considered only as a temporary stopping place.

The water along the face of the ridge (just mentioned) is very deep, and the bottom rocky and irregular. About half way along it is the entrance to a vein of lignite, which has been worked, but it is not fit for steam-ship consumption. Off this mine, at a distance of a cable's length, a depth of 35 fathoms is found, with a swell upon the rocks sufficient to destroy any boat loading there. The so-called coal is very easily broken, and crumbles by exposure to the weather.

Pillar point is in lat. 48° 18', and nearly E. $\frac{1}{4}$ S. from the north end of Waaddah island, from which it is distant 23 miles. This point is named

^{*} This rock shut in with the south-east end of Waaddah island is said to clear the rocks extending from Kaitlah point.

Pillar point from the circumstance that it terminates in a bare columnar shaped rock, slightly separated from the main ridge by a depression, it is consequently a rather remarkable object, where from the character of the country, generally thickly wooded from summit to water line, few objects present themselves by which vessels may accurately fix their position. From this point the shore trends S.S.E. about a mile, and receives a stream coming from the westward, called Canel river. An Indian village exists here. The Indian name of the stream is Pisht-st.

From Pillar point the next prominent object is a wooded hill called Striped peak, bearing E. by N., and distant 17 miles. Within this distance the shore retreats to the southward of this line of bearing (E. by N.) about 8 miles, having alternate bluff and low shores with many little streams opening upon them, and at the distance of 11 or 12 miles from Pillar point is Low point, at the mouth of a stream called the Lyre.* Rocks abound close along the shore. The kelp generally extends out to 5 fathoms, and the average depth of water, a mile off, is 10 fathoms. One mile before reaching the western part of Striped peak is a sunken rock, upon which the sea breaks at low water.† A slight indentation of the shore here has received the name of Crescent bay.

Striped peak is several hundred feet high, and wooded, and was doubtless named from a well-marked line upon its water side, occasioned by a land slide from its summit. This mark is being rapidly obliterated by the growth of vegetation. The base of the hill towards the water presents a straight line, running E. by N. for 8 miles, with deep water off it.

FRESHWATER BAY.—The eastern part of Striped peak forms the western boundary of Freshwater bay; it is named Observatory point, and has several rocks off it. The eastern side of the bay is the low delta called Angelos point, at the mouth of the river Elwha, and the two points are distant from each other 8 miles in an E. by N. $\frac{1}{2}$ N. direction. Inside of this line the depth of the curve is about $1\frac{1}{2}$ miles, with water ranging from 16 fathoms in the middle to 4 or 5 close in-shore. The western shore of the bay is bluff, the eastern low, with bluff in the rear. The waters of the Elwha bring down such quantities of earth that a depth of only 10 fathoms is found at a distance of $\frac{3}{4}$ of a mile from its mouth.‡

* The Indian name of the river is Kwa-ha-mish.

† This rock is the only known detached sunken danger off the southern coast of the strait, with the exception of a rock 11 feet under water, a short distance from the land, at about 64 miles westward from the lighthouse on New Dungeness. Westward of it some kelp grows a short distance from the beach on the somewhat sheltered part between Striped peak and Pillar point, and here the depth of water at a mile from the shore varies from 8 to 16 fathoms; westward of Pillar point it deepens to 40 fathoms at that distance.

‡ At the time of the survey, this river had two mouths, but as it runs for some distance close to the beach, it is likely that the position and number of these entrances depend very much upon the melting of the snow, and from other sources of supply in the Angelos valley, whence this river flows. From Angelos point, the hills recede, and leave a level space between them and the coast; thence they rise suddenly to a great height, their summits capped with snow, even in summer, forming some of the highest peaks of the mount Olympus range. The most conspicuous break in these mountains is a deep and narrow valley abreast this point, called Angelos valley, whence, as before remarked, the river Elwha flows in a good sized stream, having sufficient water to admit boats. The whole of this country is covered with fine wood, and abounds in deer and other game, but it is difficult to penetrate, from the underwood and fallen trees. There are several Indian lodges on and near the coast.

Freshwater bay being quite open to all winds from northward, it should only be used as a temporary stopping place. It is usual to anchor in 9 to 6 fathoms.

PORT ANGELOS.—At 4 miles eastward of the river Elwha commences a long, low, very narrow sand spit, stretching out from the bluff in a general E.N.E. direction for 3 miles, to the point called Ediz hook, which lies $1\frac{1}{4}$ miles off the main shore, thus forming an excellent and extensive harbour, with deep water of 25 to 80 fathoms, sandy bottom, close under the inside of the sand spit, almost to the head of the bay. Through the centre of the bay the surveyors say they "found a line of 15 fathoms, sticky bottom, and between that and the main it shoals very regularly with the same kind of bottom." On the outside of the spit very deep water is found close to it, and the hook may be rounded within a cable's length in 25 fathoms. In the indentation between Angelos point and the head of the bay the water is shoal, 10 fathoms being found at 2 miles from shore.*

The hook is covered with coarse grass, and in many places with driftwood, showing that the sea sometimes washes over it; it is so low that it cannot be distinguished, even in good weather, until a vessel is close upon it. From the middle of the strait it cannot be made out unless the appearance of the bluff beyond is known. At the head of the bay is a large salt-water lagoon. Fresh water is found on the south shore in several places, but the extensive flats render it hard to obtain. The bluff, 70 feet high, comes directly to the high-water line, and is covered with trees. Three Indian villages of the Clallum† existed on its shores in 1852, when a secondary astronomical station of the Coast Survey was established near the Indian graveyard at the head of the harbour, the geographical position of which is lat. $48^{\circ} 7' 52''$, long. $128^{\circ} 27' 21''$; from this station the extremity of Ediz hook bears N.E. by E., distant $2\frac{1}{2}$ miles.

Coal of fair quality is reported to have been found within 8 miles of port Angelos.

Captain G. H. Richards, R.N. says—"Ediz hook curves from a high bluff in an E.N.E. direction for nearly 8 miles, and forms a large and good harbour. On the north or spit side the water is deep, varying from 15 to 80 fathoms; but southward of a line drawn through the centre there is excellent anchorage in from 7 to 10 fathoms in any part of the port. The outer part of the spit is steep and may be closely rounded, after which the port extends for $2\frac{1}{4}$ miles in a westerly direction, by more than a mile in breadth. Although open to easterly winds, they do not blow home. A large spar beacon painted *white* has been erected on Ediz hook, which is a good guide to the entrance during day time,

* It may be remarked here that, in every instance these remarkable shingle spits are thrown out in the direction of the flood stream. and it is probable that this is a rule which obtains in every part of the world, for wherever a shingle spit is thrown out, it generally takes the direction of the flood stream, let the prevailing winds be what they may. This circumstance may be a useful hint, in the construction of works for preventing the growth of shingle spits.

† The tribes now generally but erroneously known by this name call themselves the Nus-kiai-yum; they occupy the American side of the strait from the O'ke-ho, 13 miles from Nee-ah bay. Their congeners are the Tsok and Sugh-us on part of the Vancouver side.

Fresh water is to be obtained from streams on the south side of the port.

The spit is so low that at times the sea washes over it, and as it is impossible to see it at any distance, vessels would be apt at night to run on it if passing close to the southern shore of the strait; Dungeness light therefore should not be brought to bear northward of E. by N. $\frac{1}{4}$ N., which will lead more than 2 miles off, but as the spit is nearly 13 miles from the light, the latter would not in all states of the weather be visible. At a distance of more than 2 miles from the shore a depth of 14 fathoms will be found N.N.W. from that part of the spit which joins the main land; at night vessels should not go within this depth."

The Coast.—From the extremity of Ediz hook to the lighthouse on New Dungeness the bearing is N.E. by E. and distance $12\frac{1}{2}$ miles, being a chord of a large but not a deep bay. From the Indian lodges abreast the entrance of port Angelos to Green point the bearing is N.E. by E. $\frac{3}{4}$ E. and distance 5 miles; this coast is composed of high sandstone cliffs, mostly bare. With reference to port Angelos, it will be seen that the cliffs on both sides are for the most part bare of trees, and composed of white sandstone; whilst those within the harbour are nearly covered with trees, and thus form a dark break or interval in the white line of cliff, which is easily distinguished from seaward. At 2 miles from the lodges there is a break in the cliff, where a small river or brook finds its way to the beach; an Indian lodge is close to it. The beach is mostly shingle and sand, but at low water the flat portion as well as all the salient points are found to consist of boulder stones; this is particularly the case at Green point, where another small stream runs out, and a break in the cliff affords access to the country by means of a narrow valley. From Green point to the bight or turn of the bay, which is marked by another break in the cliff, the bearing is N.E. by E. $\frac{3}{4}$ E. and distance $2\frac{1}{2}$ miles; this part of the coast makes a sweep or bend, and is formed of the same high and inaccessible sandstone cliffs, as before described, and it may be remarked here that they preserve this character all the way to the turn of the Dungeness cliffs, and that there is but one break in them.

At high water spring tides, the sea washes the foot of these cliffs, but as the water recedes, a road is formed by the fine sandy beach, which the Indians and wild animals prefer to forcing their way through the thick forest above them. At $1\frac{1}{2}$ miles N.E. by E. from Green point, and $\frac{1}{4}$ a mile from the beach, lies a sunken rock, having only 11 feet on it at low water, but 6 to 10 fathoms all round; it is well marked by kelp, and only lies in the way of vessels working up under the lee of New Dungeness. From the before mentioned bight or break in the cliff, the coast runs north-easterly for $4\frac{1}{2}$ miles; of this only 2 miles are cliff, for it then makes a sudden bend to eastward for $2\frac{1}{2}$ miles, forming the base of the long, curved, Dungeness spit, which commences at the spot where the cliffs turn, and where they become less steep, and are clothed with trees. From the termination of the above straight line, the spit sweeps round, and runs N. 49° E. $1\frac{1}{2}$ miles to the point. The whole of this spit is composed of shingle and sand, and is very narrow, except at the northern apex of the interior lake, where the junction of the inner and outer coast lines forms a broader and higher belt. With this exception, when the tides are high and a strong westerly wind is blowing, the sea washes over the whole of it, covering its summit with abundance of drift wood, amongst which are some very large trees.

Within a supposed line connecting Ediz hook and New Dungeness, the

soundings are regular, shoaling from 18 and 25 fathoms to 5 and 8 fathoms, the latter being at a $\frac{1}{4}$ of a mile from the beach. Outside the line the soundings increase very gradually to 80 or 90 fathoms, but abreast the turn in the spit the deep water approaches very close, and continues to do so up to the shoal that runs from the end of it, as much as 50 fathoms being found at less than $\frac{1}{4}$ of a mile from the beach.

In easterly winds, anchorage may be had in this bay, but it is too much exposed to westerly and north-westerly winds to be recommended.

From the extreme end of Dungeness point, a shoal extends in a north-easterly direction nearly $\frac{1}{4}$ a mile, having only 2 to 2 $\frac{1}{2}$ fathoms over it at low water spring tides. It is narrow, but very steep, the lead falling almost at once from 5 or 6 fathoms just off its extremity into 20 to 30 fathoms; therefore, when hauling round the point, be careful to give this shoal a wide berth, as the tide sets over it with considerable strength, causing a strong overfall, and in bad weather a very nasty sea.

NEW DUNGENESS BAY.—The spit just described encloses a large space available for anchorage, where shelter may be found from any winds, from North, round by the west, to S.E., in from 5 to 10 fathoms, and even with the wind at S.E.; this space is known as New Dungeness bay. The land immediately eastward of the bay around port Discovery and Protection island prevents any great sea, which is consequently not felt till the wind gets about East. The bottom is stiff mud, forming a very tenacious holding-ground, and there is but little tide. Very good water may be had in a cove at the bottom of the bay close to the entrance of the lagoon. At low tide, however, the flat which fills up this bight and extends some distance out is a great hindrance to a watering-party. When going either up or down the strait, New Dungeness bay is a more convenient place to wait for tide or daylight than port Discovery, or the anchorage under Protection island, as it is more easy of access and egress, and has less depth of water.

The outside of the spit has been described; the inside is precisely similar, except that the beach, which shoals off very gradually, leaves a mud flat, narrow towards the point, but gradually widening as it sweeps into the bight of the bay, where it extends $\frac{1}{4}$ of a mile off the shore, and is mostly dry at low water springs, leaving, however, a very narrow channel into the lagoon. The southern part of the spit, enclosing the lagoon, is of the same character as that outside, but narrower and not so high. The entrance to the lagoon is narrow and choked with shoals, but at high water a small vessel may enter, and find sufficient depth within to float her at low water. The southern side of the entrance is formed by two points or spits, the inner one of which runs out from the east end of the cliff before mentioned, and almost overlaps the North spit. The outer point is the end of a spit of shingle which forms the commencement of the beach that runs to the eastward and makes the coast line in that direction.

A lighthouse coloured black and white has been erected on the extremity of the sand spit. It is 89 feet high, and shows a *fixed* light at 100 feet above the sea; visible 14 miles. Its geographical position is lat. 48° 10' 59", long. 123° 6' 7", and from it Striped peak bears S.W. by W. $\frac{1}{4}$ W., distant 21 miles; Race rocks lighthouse, West, 18 miles; Esquimalt harbour lighthouse, N. 66° W., 20 miles; Victoria harbour, N.W. by W. $\frac{1}{4}$ W., 17 $\frac{1}{2}$ miles; Smith island lighthouse, N. 81° E., 18 $\frac{1}{2}$ miles; point Wilson, E. by N., distant 14 $\frac{1}{2}$ miles; and Admiralty head lighthouse, S. 73° W., 17 $\frac{1}{2}$ miles.

Fog-bell.—Upon the outer extremity of the spit a fog-bell of 1100 lbs.

has been placed, and is sounded every 10 seconds during foggy or other thick weather day and night. The striking machinery is in a frame building, with the front open to receive the bell, painted black, raised 80 feet above the ground on an open structure, whitewashed.

Mr. Davidson U.S. Coast Survey thus describes New Dungeness bay "The shore from point Angelos gradually curves to the north-eastward, and about 8 or 9 miles from Ediz hook another long, low, narrow sand spit, covered with grass, leaves the bluff shore and stretches in a general N.N.E. direction for $8\frac{1}{2}$ miles, forming the north-western shore of the roadstead of New Dungeness. On the inside, 1 mile from the eastern extremity, another narrow sand spit makes $1\frac{1}{2}$ miles southward towards the main shore, forming a large inner shoal bay, with a narrow opening, through which the water passes, as over a rapid at low tide. Abreast of this point is a small stream, affording an abundance of fresh water but boats must obtain their supply at low tide, and come out when the tide has sufficiently risen. The western side of this stream is a bluff 60 feet high, and upon it is a large village of the Clallums. The eastern shore of the stream is low, swampy, and covered with trees and brush. It forms the southern or main shore of the roadstead, and off it lie extensive mud flats, which are bare at low water for $\frac{1}{2}$ of a mile, and run as far as Washington harbour. Shoal water exists some distance outside of these flats. Soundings of about 20 fathoms are found at a $\frac{1}{4}$ of a mile southward of the lighthouse, the depth regularly decreasing across the bay, with a soft, tenacious, muddy bottom. The usual and best anchorage is to bring the lighthouse to bear about N. by E. $\frac{1}{2}$ E., $\frac{1}{2}$ a mile distant, when 10 fathoms are found at $\frac{1}{4}$ of a mile broad off the beach. With the lighthouse bearing N.W. by N. $\frac{1}{4}$ of a mile distant, the same depth and bottom are found. The nearest shore will bear South $1\frac{1}{2}$ miles, and the mud flat $\frac{1}{2}$ of a mile in the same direction. A south-east wind drawing out of the strait blows directly into this harbour, but the bottom will hold any vessel with good ground tackle. The only difficulty will be to get the anchors out of the mud after riding a couple of days to a gale. In the last position a vessel can readily get under way and clear the point.

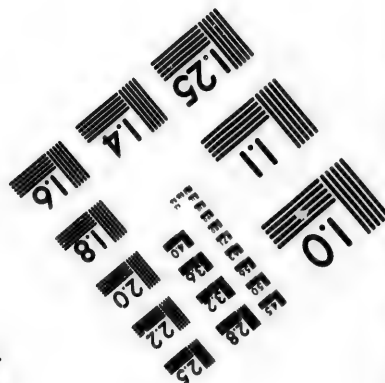
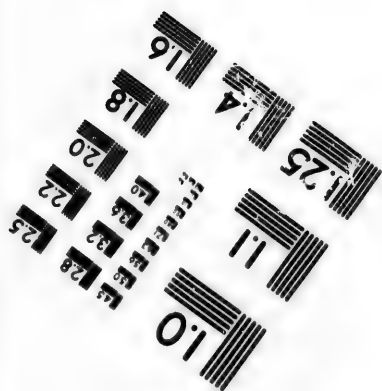
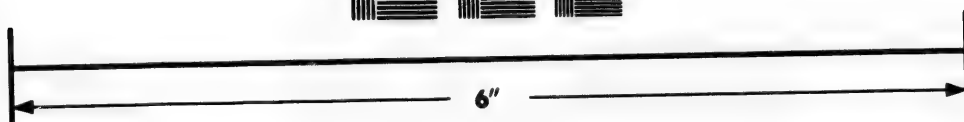
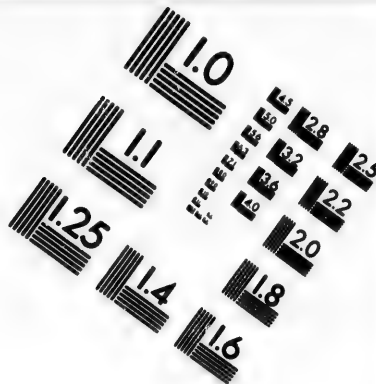
This point is so low that vessels bound in or out, before the erection of the lighthouse, were upon it before they were aware of their danger. Several had run ashore on the outside beach, and in 1855, while we were anchored close in, with the weather thick and hazy, a vessel from Admiralty inlet had been set out of her course by the currents, and came driving in with studding sails out, and only saw her mistake and danger when the black hull of our vessel attracted her attention.

A shoal with $2\frac{1}{2}$ fathoms makes out from the end of the point for $\frac{1}{4}$ a mile, and a heavy tide-rip runs over it at the change of the currents.

Tides.—The approximate corrected establishment is 3h. 3m., and the approximate mean rise and fall of tides 5 feet."

From New Dungeness harbour the coast trends in an E. by N. direction $14\frac{1}{2}$ miles to Wilson point on the east side of the entrance to Admiralty inlet, the channel leading to Puget sound. Within this space are Washington and Discovery harbours, of which the latter is the easternmost.

WASHINGTON HARBOUR.—From New Dungeness roadstead to the entrance of this harbour the immediate shore is low, flat, covered with trees, and bordered by an extensive mud flat; but behind it, at a very short distance, rises a level plateau. The bluff at the N.E. point of the harbour is



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seen from Dungeness point. The entrance to the harbour is nearly closed by a low sand spit stretching across it from the east almost to the west coast, where a narrow channel way exists having a depth of 2 fathoms through it; this cannot be seen from Dungeness point, which is $6\frac{1}{2}$ miles from it in a N.W. direction, on account of the outward curving of the intermediate shore. Inside of this spit are soundings of 17 fathoms shoaling to 8 fathoms as the head of the harbour is approached. The width of the harbour is a little over a mile, and its length is about 8 miles; its general direction is S.E. by S. The depth at a mile outside of the sand spit is 10 to 12 fathoms, deepening rapidly to 80 and 85, with a bottom of stiff mud. The Indian name of the bay is S'quim, by which it is generally known to the settlers.

Protection Island.—The western extremity of this island lies E. $\frac{1}{2}$ S., distant $7\frac{1}{2}$ miles from Dungeness lighthouse, whence it extends $1\frac{1}{2}$ miles N.E. $\frac{1}{2}$ E.; it is a narrow island, curved outward to the strait, and having a low point at each end, with shoal water stretching from the western. Its sides are very steep, and about 200 feet high, the seaward part covered with timber, and that towards port Discovery undulating and covered with fern. It lies 2 miles directly off (N.W.) the entrance to port Discovery. Southward of it is very deep water, but northward or outside it a line of kelp, about $\frac{1}{2}$ a mile out, marks the 4-fathom curve, and from this a bank runs out N.N.W. for 8 miles, having from 5 to 15 fathoms upon it, with a shoal spot of 3 and 4 fathoms at about 2 miles from the island. Upon this bank, named Dallas bank, is good anchorage with light airs and strong adverse currents; the bottom is irregular and falls off suddenly.

Protection island, with ports Angeles and New Dungeness, affords the first examples of the peculiar feature of low, sandy, and gravelly points covered with coarse grass and bushes, making out from the high cliffs, where the tendency of strong currents would seem to be to cut them off.

It was called Protection island by Vancouver in 1792, and on account of its position in relation to port Discovery is very aptly named.

PORT DISCOVERY.—From Dungeness light the west side of the entrance to port Discovery, called Challam point, bears E. by S. $\frac{1}{2}$ S., distant 9 miles. From Washington harbour the distance is 4 miles;—the intermediate shore is composed of high steep cliffs. Cape George, the eastern point of the entrance, bears N.E. $\frac{1}{2}$ E. $1\frac{1}{2}$ miles from Challam point, and is a steep bluff rising directly from the water. The average width of the bay is nearly $1\frac{1}{2}$ miles for 9 miles of its length, and then decreases rapidly to the Salmon river at its head. It makes four general courses from the entrance to the head, as follows: $1\frac{1}{2}$ miles South, 4 miles E. by S. $\frac{1}{2}$ S., $2\frac{1}{2}$ miles S. by E., and $1\frac{1}{2}$ miles S.W. by S. The shores are abrupt, and covered with wood to their edges, and the projecting parts are all terminated by low points stretching out short distances. On the second point, on the eastern side, [were the remains of an extensive stockaded village of the Clallams in 1856. Mount Chatham lies off the south-western part of the bay, and reaches a height of 2100 feet.

When well in this bay Protection island so completely shuts up the entrance as to make it appear as a large lake. The great drawback to this port is the depth of water, which in mid-channel is not less in any place than 25 fathoms, and in some is 40 fathoms. Under the second low point on the east side the surveyors could not find less than 25 fathoms at a few ship's lengths from the beach, but found good anchorage in 20 fathoms, soft bottom, on the western shore, 2 miles S.S.E. from Challam point, and abreast of a low swampy beach.

At the head of the bay it contracts in width, the water shoals, a large mud flat exists for the last mile, and the shores become higher, but in places the hills retreat, and give a scanty space for a few settlers' cabins. For a few years after the settling of San Francisco many vessels came here for piles and spars; but a saw-mill has been built here.

Vancouver says "The projecting points in port Discovery usually acquire a form somewhat circular, though irregular; and, in general, are nearly steep-to, extending from the cliffy woodland country, from 100 to 600 yards towards the water's edge, and are composed of a loose sandy soil. The surface of some was almost entirely occupied by a lagoon of salt water, or brackish swamp; others were perfectly dry; no one of them produced any trees; but were mostly covered with a coarse spiry grass, interspersed with strawberries, two or three species of clover, samphire, and a great variety of other small plants, some of which bore very beautiful flowers. On a few of the points were some shrubs that seemed to thrive excessively, such as roses, a species of sweet-briar, gooseberries, raspberries, currants, and other small bushes, which in their respective seasons, produce most probably the several fruits common to this and the opposite side of America. These all appeared to grow very luxuriantly; and, from the quantity of blossoms with which they were loaded, there is great reason to believe them very productive.

We had little trouble in clearing a sufficient space for our encampment, which was commodiously situated, close to the north side of the stream or brook. In my excursion up the harbour, I found that it extended about 4 miles from the ship, and then terminated in a muddy flat across its head, about a $\frac{1}{2}$ of a mile from the shore. The water, which was 7 fathoms deep close to the flat, gradually deepened to 10, 20, and 80 fathoms, good holding-ground. On this bank were found some small indifferent oysters. The shores beyond it are low and thickly wooded, and through them there appeared to run a very considerable stream of water, with several smaller ones, emptying themselves into the harbour. The back country had the appearance of a swampy fen for a considerable distance. We landed not far from the largest rivulet, where we found a deserted village, capable of containing about 100 inhabitants."

If port Discovery lies under any disadvantage it is its great depth of water; but the bottom is excellent holding-ground, and free from rocks. Towards the upper part of the harbour it decreases in depth, and there is perhaps not a more eligible spot for riding than off the first low sandy point on the western shore, about $4\frac{1}{2}$ miles from the entrance; here Vancouver anchored, and obtained supplies of wood and water. The country in the neighbourhood of the port is of moderate height, although bounded on the west side by mountains covered with snow, to which the land from the water's edge rises, in a pleasing diversity, by hills of gradual ascent. The snow on these hills probably dissolves as the summer advances, for pine trees are produced on their very summits. On the sea shore the land generally terminates in low sandy cliffs; though in some spaces of considerable extent it runs nearly level from high water mark. There are few places where the variety and beauty of the flowers are so great as they are here; the general character of the soil around this harbour is a thin, black, vegetable mould, with a substratum of sand and gravel. The vigour and luxuriance of its productions prove it to be a rich fertile mould, which might possibly be considerably improved by the addition of the calcareous matter contained in the marlstone that presents itself in many places.

The trees grow so closely, that in some places the woods are almost impenetrable. The timber consists principally of pine, fir, and spruce. Of the latter there are two species, one of which resembles the hemlock-spruce of the United States; it has a very tall growth, and puts out but few, and those but small lateral branches. Some maple-trees grow in the open ground and on the banks, but they are too small to be of any service to the settler.

Port Discovery was visited in 1841, by Com. Wilkes, U.S. Navy, who remarks:—"After passing Protection island, an extensive bay opened, on the shores of which we saw the long poles mentioned by Vancouver, and represented in his book. The use of these he was unable to discover, but the Indians informed us that they were for the purpose of suspending nets for taking the wild-fowl that frequent these shores in great numbers. On these poles the nets are set up at night, at which time the geese search these grounds for food; fires are then lighted, which alarm the birds, and cause them to fly against the nets, by which they are thrown upon the ground, where, before they have time to recover themselves, they are caught and killed.

The description of Vancouver is so exactly applicable to the present state of this port, that it was difficult to believe that almost half a century had elapsed since it was written. The beautiful woods and lawns of Protection island, in particular, exist unchanged. The lawns still produce the same beautiful flowers and shrubs, and though closely surrounded by dense woods, do not seem to have been encroached upon by their luxuriant growth, although there is no apparent reason why it should not, long ere this, have overrun them.

The name of port Discovery was given by Vancouver. Protection island covers it completely to the north, and would render it easily defensive against the most formidable attack. The only objection to it as a harbour is the great depth of the water, which in the middle is nowhere less than 40 or 50 fathoms, and is often as much as 16 fathoms close to the shore."

Point Wilson.—At about 6 miles eastward from port Discovery is point Wilson, the western point of the entrance to Admiralty inlet. From Dungeness light it bears E. by N., distant nearly 15 miles, this course passing over the outer edge of the 8-fathom shoal (Dallas bank) off Protection island. The extremity of the point is composed of low sandy hillocks, covered with coarse grass; but west of it the hill rises 200 or 300 feet, and again falls inshore. This appearance is well seen in approaching it from the strait, and is a good mark. Between the point and port Discovery the shore is high, with steep yellow cliffs, and about midway a slightly projecting angle is formed, called Middle point. To the north-west of the point 15 fathoms can be obtained a mile from the shore, but the water shoals suddenly, and when running in a fog the lead must be kept going. Off the eastern end of the point 20 fathoms can be got at a ship's length from shore. During ebb tides a very strong eddy current sets to the eastward along shore between port Discovery and point Wilson. The surveyors state that "in 1855, when coming out of the inlet on the large ebb, with scarcely any wind, we kept outside of the rip showing the line of the eddy. A vessel 2 or 3 miles ahead was in the eddy at the same time. We were carried past Protection island, but she was drifted back to point Wilson. The Indians when bound to Dungeness keep well out in the ebb."

The country between ports Discovery and Townshend of which point Wilson is the northern extremity, consists of a peninsula 3 miles in breadth

and 10 miles in length, offering great advantages as a location for a town. It is known as Quimper peninsula.

NORTH SHORE OF THE STRAIT TO CHATHAM ISLANDS.

From point Bonilla to Owen point, the western head of the entrance to San Juan bay, the shore runs 18 miles in an E. $\frac{1}{2}$ N. direction. It is nearly straight, rocky, and bluff, with high mountains rising immediately behind it, and all heavily wooded. A depth of from 10 to 20 fathoms is found within $\frac{1}{2}$ a mile of the shore. Vessels are apt to lose much of the wind when close under either shore of the strait, and at present it is impossible to say where the strongest currents run.

SAN JUAN BAY.—This is the first bay on the north side of Juan de Fuca strait eastward of Bonilla point. It is a good roadstead with all winds from the land, but not with those from south-westward as it is quite exposed to that quarter, and when the wind blows with any strength in the offing a heavy sea is sent in. Although the swell can generally be avoided to some extent by anchoring well within the bay, at a moderate distance from either side, it is not considered advisable to remain when there is an indication of the wind veering to the south-westward, but to weigh immediately and seek shelter either in Neé-ah harbour or in some convenient bay within the strait. Neé-ah harbour bears S. by W. $10\frac{1}{2}$ miles from this bay.

Port San Juan can be recognized from a considerable distance, in consequence of the opening making as a deep gap between two mountain ranges.* From the lighthouse on Tatoosh island (cape Classet), the centre of the entrance bears N.N.E. $\frac{1}{2}$ E., and Observatory rocks off the east point of entrance N.E. by N. $\frac{1}{2}$ N., distant $14\frac{1}{2}$ miles. The light is visible from the anchorage, and is of service to vessels entering or leaving the bay.

The *west* point of port San Juan is known as point Owen. It has some rocks about it, and a low flat rock, named Owen island, lies off it at rather more than a cable's length; this island is awash at high water, and at a very short distance from its south side is a depth of 8 fathoms. Within the bay, on this (its west) side, are other rocks and broken ground to the distance of about a mile from Owen island; and extending out 2 cable's length from the shore. The outermost of the rocks is a small patch awash at low tide situated N.E. $\frac{1}{2}$ E., 4 cable's from Owen island, and as much as $2\frac{1}{2}$ cable's length from the shore; as there is a depth of 4 fathoms, rapidly deepening to 6 and 7 fathoms, close to this rock, it requires some care to avoid.

The *east* point of port San Juan is distant about $1\frac{1}{2}$ miles E. $\frac{1}{2}$ N. from the west point, and is readily known by the Observatory rocks (some high pinnacles having a few trees growing on them, and about and around which are other rocks) a short distance off it. At nearly $\frac{1}{2}$ a mile northward from these rocks, and on the same side of the bay, a reef, partly above water and named Hammond rocks, extends out from the shore $1\frac{1}{2}$ cable's length.

* Mr. Davidson, U.S. Coast Survey says "The sides of port San Juan are steep, high, and backed by heavily timbered hills and mountains. At a distance in very clear weather it is difficult to distinguish the entrance unless one is acquainted with the locality, but in moderately hazy weather the indentation is readily made out. When steering up the bay a mid-channel course clears everything well."

From the entrance the bay runs nearly $8\frac{1}{2}$ miles in a N.E. by N. direction, and maintains throughout a breadth of $1\frac{1}{2}$ miles. Its head consists of a beach of muddy sand, at the north end of which is Gordon river, and at the southern end Cooper inlet; these streams are sufficiently deep at high water to permit the entrance of vessels of light draught. On the south bank of the river Gordon is an Indian village named Onismah.

The soundings at the entrance to port San Juan, midway between Owen island and Observatory rocks, are 18 to 11 fathoms. From this depth they gradually decrease towards its head, where at $\frac{1}{2}$ of a mile from the beach is a depth of 14 to 17 feet; in this latter part the sea breaks during heavy gales. A swell usually prevails in the entrance. Throughout the bay the bottom consists of fine muddy sand.

The usual place of anchorage is in 7 to 6 fathoms at about $1\frac{1}{2}$ miles from the head of the bay, with Owen island bearing S.W. and Adze head (the second projecting point of the east shore, from Hammond reef) E.S.E.

The approximate geographical position of Observatory rocks is lat. $48^{\circ} 31' 30''$, long. $124^{\circ} 26' 38''$.*

The Coast.—From port San Juan the shore of Vancouver island trends east 24 miles to Sherringham point, and presents no very remarkable features; the country is thickly wooded, and the land rises to a considerable elevation. At 8 miles eastward of port San Juan is Providence cove, a small inlet only fit for boats; and at the distance of 7 miles farther eastward, in a small bight, is a stream named Sombrio river. The river Jordan, a considerable stream, is $18\frac{1}{2}$ miles eastward from port San Juan, and $5\frac{1}{2}$ miles westward from Sherringham point. The soundings off this coast so far as Sombrio river are deep and not very regular, being from 16 to 20 fathoms at a mile from the shore, then suddenly dropping into 50 and 60 fathoms. Between Sombrio river and the river Jordan the depth is 7 to 10 fathoms at a mile from the land; off the latter river the depth of 10 fathoms extends further out than 2 miles. At a mile southward from Sherringham point are soundings of 40 to 50 fathoms.

Eastward of Sherringham point the shore curves a little to the northward, and at the distance of $4\frac{1}{2}$ miles in an E. $\frac{1}{2}$ N. direction is Otter point. From Otter point the entrance to Sooke inlet is E. by N. $\frac{1}{2}$ N., distant $8\frac{1}{2}$ miles, the intervening coast forming rather a deep indentation named Sooke bay, in which vessels may anchor in fine weather at rather more than $\frac{1}{2}$ a mile from the shore in 8 fathoms. Generally speaking the projecting points on the north side of the strait are not remarkable nor easily distinguished unless viewed from close in shore; some of their extremes are partially bare of trees. Vessels running or working up the strait at night should be careful not to get so near the north shore as to shut in Race island light by Beechey head.

SOOKE INLET.—This is a narrow channel, $8\frac{1}{2}$ miles long, leading into a wide basin 2 miles in extent, which is perfectly landlocked, and has a depth of 10 to 15 fathoms. The inlet is difficult to navigate, on account of its winding direction. On its northern side the water is shallow, and sands

* The Observatory rocks are $17' 15''$ east of Tatoosh island lighthouse, considered to be in long. $124^{\circ} 48' 48''$. From the observations of Captain G. H. Richards, R.N., the Pinnacle rock, north side of the bay, is in long. $124^{\circ} 27' 37''$, supposing Duntize head, Esquimalt harbour to be in long. $123^{\circ} 26' 45''$. Unfortunately the Pinnacle rock is not mentioned in the Admiralty plan of port San Juan (No. 1910).

off several spits of shingle, one of which joins Whiffin island, so that the entrance is limited to a few yards in width. The depth is from 8 to 9 fathoms, and the course is in along the eastern shore; but such is the strength of the tides, and the intricacy of the channel, that it is recommended not to attempt to enter without a pilot.

Vessels may anchor in 10 fathoms at $\frac{1}{4}$ a mile outside the entrance of Sooke inlet, and, if necessary for shelter, may with a fair wind run inside Whiffin island, where there is sufficient space to anchor.

Whiffin island is low, gravelly, and as already noticed is always connected with the western shore of the islet. Its eastern point (bearing N.N.E. distant $\frac{1}{4}$ of a mile from the centre, between the two entrance points) must be rounded close, leaving it on the port hand, as a reef lies only $\frac{1}{4}$ a cable eastward from it. On rounding the point drop the anchor at a cable's length within in 8 fathoms; here there is a space of deep water 2 cable's in extent.

From the depth of 10 fathoms outside the entrance to Sooke inlet a high hill on the eastern side of the inlet, named mount Maguire, will bear about N.E. It is partially covered with trees, but the bare rock shows distinctly in many places, and this feature now commences to distinguish the south-east part of Vancouver island. The shore in many places is bare and rocky, with patches of land covered with fern and destitute of trees, and the houses of settlers begin to appear.

Secretary Island.—On the eastern side of Sooke inlet, and at $1\frac{1}{4}$ cable's length from the coast, is Secretary island, a small, but bold rocky islet, separated from the shore by soundings of 15 to 16 fathoms. Its approximate geographical position is lat. $48^{\circ} 19' 95''$, long. $128^{\circ} 42' 40''$ * The depth at $1\frac{1}{4}$ miles southward of it, is 80 to 90 fathoms.

BECHER BAY.—From Secretary island to Beechey head, the west point of entrance to Becher bay, the distance is $2\frac{1}{4}$ miles in an E. $\frac{1}{4}$ S. direction. The shore between is bold and steep, and has deep water almost close to it. The head, a bold wooded cliff, has soundings of 40 to 50 fathoms immediately off it; around it the currents have very great strength, hence more than ordinary care is required when seeking anchorage in Becher bay.† When bound eastward through the strait, the land about this headland should have a berth of 2 miles if it be intended to pass southward of Race islands. The approximate geographical position of the head is, lat. $48^{\circ} 18' 80''$, long. $128^{\circ} 89' 27''$.*

Becher bay has an extent of $1\frac{1}{4}$ miles. Its east point, cape Church, is distant from Beechey head $2\frac{1}{4}$ miles in an E. by N. $\frac{1}{4}$ N. direction. The bay, as an anchorage, cannot be recommended as it is open and exposed to the full force of southerly winds. About and around it are high rocky hills, and even in fine weather inconvenience is occasioned by the strong gusts which descend from the mountains; vessels bound westward through the strait and meeting with a southerly wind are therefore recommended to seek in preference the anchorage in Parry bay, as they will then be sheltered from heavy seas by Race islands.

* Dependent upon Duntze head, Esquimalt harbour, being in long. $128^{\circ} 26' 45''$. The Indian name of the inlet is T'sok.

† "The currents go by Beechey head with a rush. In this vicinity, we recollect the instance of a United States revenue cutter striking the bold shore with her flying jib-boom, and only striking her forefoot after the jib-boom had been carried away." Mr. Davidson, U.S. Coast Survey.

Off cape Church are three rocky islets, of which the outermost bears the name of Church island; this has a depth of 9 fathoms close to it, rapidly deepening to 25 and 40 fathoms, the latter being at about $\frac{1}{4}$ of a mile from it. Westward of these, and on the eastern side of the bay, are several small wooded islands, called the Bedford islands. Within the bay are Frazer and Wolfe islands with some small islets about them; the easternmost and largest island is that named Frazer,—the westernmost is Wolfe island. Some small islets also lie in the eastern part of the bay, close to the shore.

The depth at the entrance to Becher bay, midway between Bedford islands and the western shore, is 50 to 40 fathoms on a rocky and irregular bottom; thence it gradually decreases to 9 and 6 fathoms at its head. The passage in is between Frazer and Wolfe islands and is 4 cables' length wide. From these islands the course to the anchorage is north-easterly about $\frac{1}{4}$ of a mile. The usual place of anchorage is at about $\frac{1}{4}$ of a mile N.N.E. from the centre of Frazer island in 10 fathoms at low water.

Bentinck Island.—From Becher bay to Bentinck island, off the south-easternmost part of Vancouver island, the coast trends irregularly 2 miles. This island is rather more than $\frac{1}{4}$ a mile in extent, is about 100 feet high, and, like the adjacent land, covered with pine trees; its southern and eastern sides are fringed with kelp, outside of which it is believed there are no sunken dangers. Its shape is very irregular, as it is almost divided in the middle.

The narrow channel between Bentinck island and the shore is so thickly strewn with rocks so as to be scarcely navigable; it is however sometimes traversed by boats. Coasters who are well acquainted with the locality occasionally anchor in the eastern entrance to this channel, and obtain shelter from southerly winds. The currents hereabout have great strength, and also run through the passage with considerable velocity.

Race Islands.—These are a cluster of low rocky islets, the larger of which are about 10 in number, situated a short distance south-eastward of Bentinck island. The outermost and largest islet is 5 miles E. by N. from Beechey head, and 1 mile S.E. from Bentinck island. The extent of the group is rather more than $\frac{1}{4}$ a mile north and south, and the same east and west, and all the islets are bare of trees or bushes, grass only growing on the principal ones. The bottom for about $\frac{1}{4}$ a mile from them in a south-easterly direction is irregular, with points of rock in 5 fathoms. The tides among them run from 8 to 6 knots per hour, and during bad weather heavy and dangerous races occur; it is consequently a very difficult neighbourhood for sailing vessels during calms. In light winds the islands should have a good berth, especially when eastward of them, as the ebb sets strongly towards them. In 1860 a large vessel was drifted on them by the ebb tide in a calm, and became a total loss.

The outermost, or Great Race islet, is $1\frac{1}{4}$ cable's in extent and 25 feet high. It should always have a berth given to it of about a mile, at which distance is a depth of from 40 to 50 fathoms; it may, however, be rounded at a less distance, the outermost danger from it, the Rosedale rock, 5 feet under water, being nearly $\frac{1}{4}$ a mile from it in a S.E. by E. direction.

The lighthouse on the Great Race islet consists of a keeper's dwelling of stone with a tower of the same material, the latter being painted with alternate horizontal black and white bands. It exhibits, at an elevation of 118 feet above the mean level of the sea, a light *flashing* every 10 seconds, visible in clear weather at a distance of 18 miles. Its approximate geographical position is lat. 48° 17' 45", long. 123° 32' 15". From it, the light at

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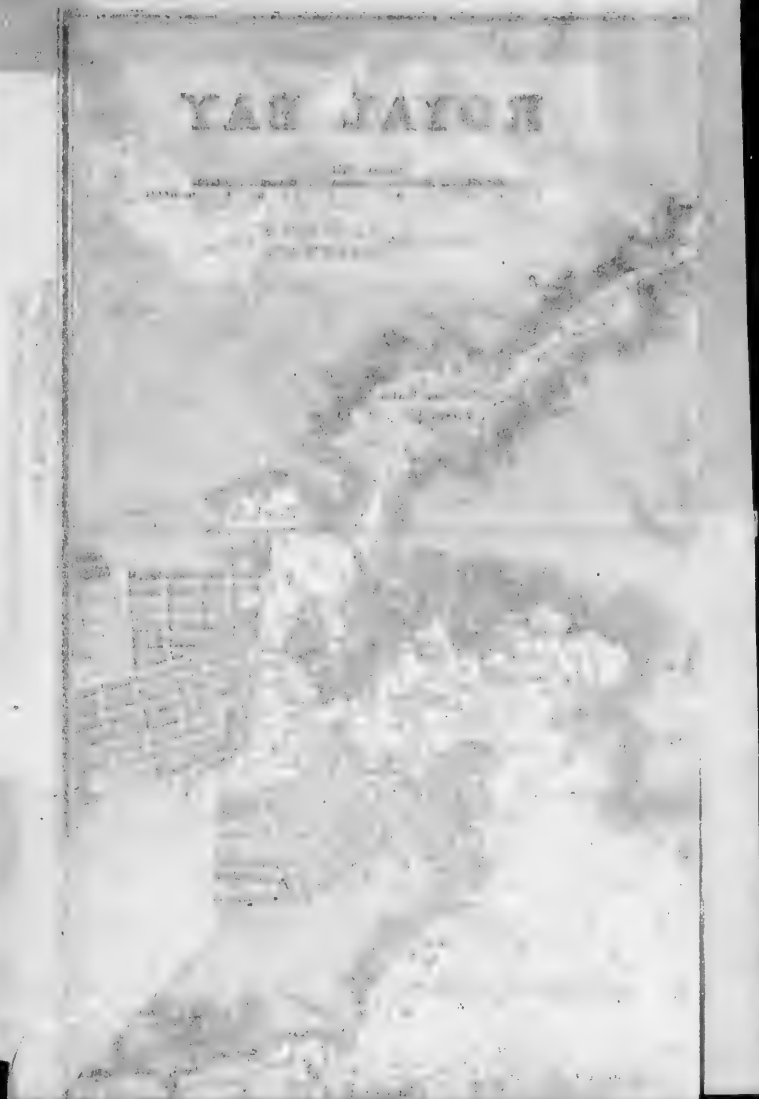
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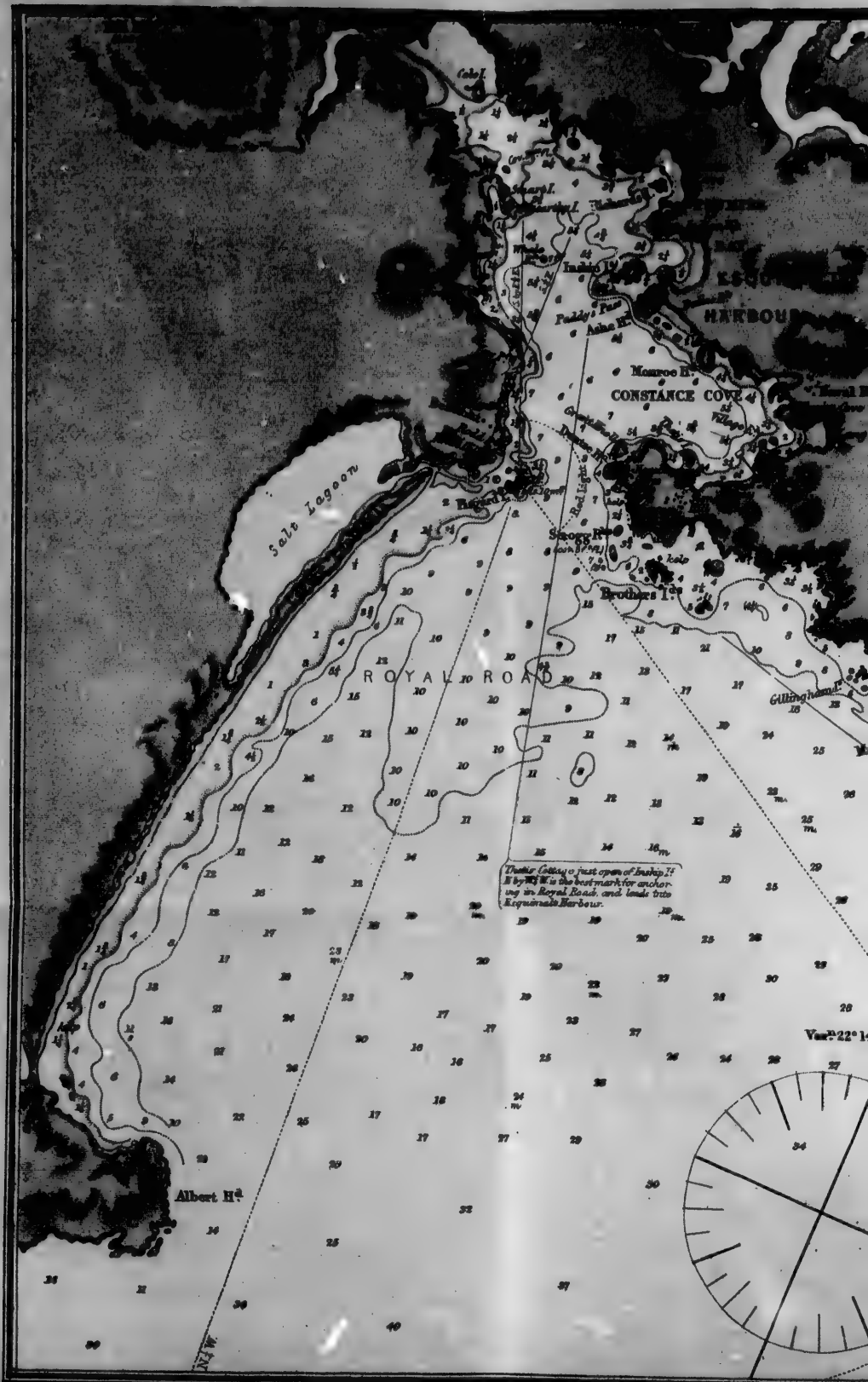
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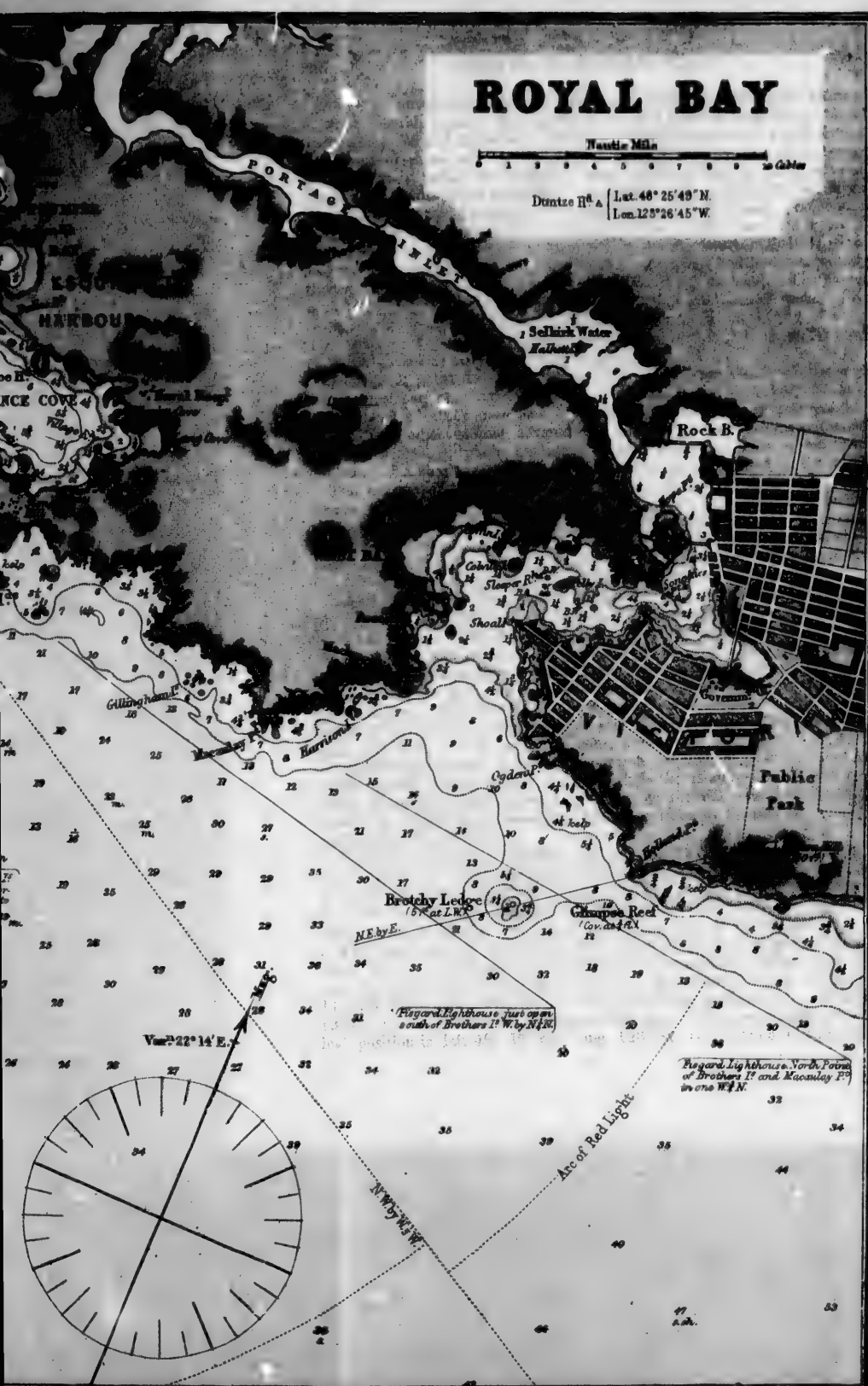


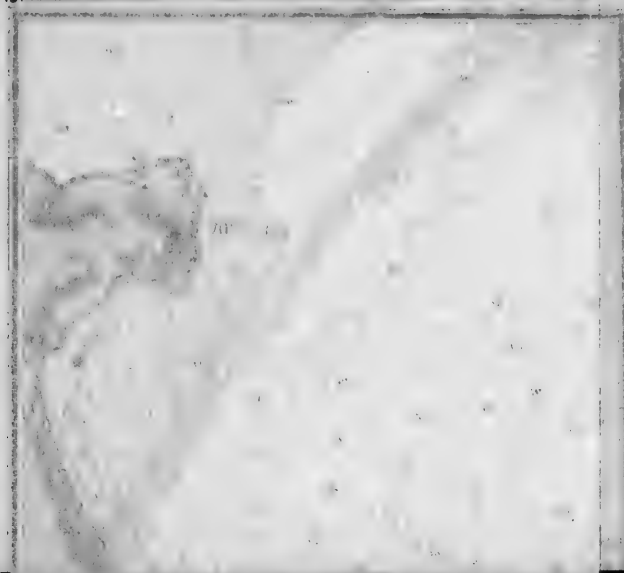
ROYAL BAY

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Esquimalt harbour bears North, distant $8\frac{1}{2}$ miles; entrance to Victoria harbour N. by E. $\frac{1}{2}$ E., 9 miles; Trial islands N.E. by N., $10\frac{1}{2}$ miles; Discovery island N.E. by N., 15 miles; Smith island light N. 85° E., $26\frac{1}{2}$ miles; and New Dungeness light East, 18 miles. Attached to the lighthouse is a fog-bell.

The channel between Bentinck island and Race islets is nearly $\frac{1}{2}$ a mile wide, and with the exception of some rocks (covered at high water) at a cable's length westward of the north islet, is believed to be free from danger; its least depth is 14 fathoms. This passage may be taken by a steamer; but it is not recommended for a sailing vessel under ordinary circumstances, on account of the strength of the tides, and races caused by the irregular rocky bottom. A case may arise, however, either inward or outward bound, when a vessel overtaken by a strong S.E. wind would do better to run through than risk weathering the Great Race by less than a mile; if so the Bentinck island shore should be kept aboard at a distance of 2 cables, or just outside the kelp, for the north islet which forms the southern side of the passage, is only 11 feet above water at high tide, and the strongest tides and eddies are found in its neighbourhood. The course through is N.N.E. and S.S.W.

PEDDER BAY.—Immediately northward of Bentinck island is Pedder bay, an inlet having an extent of nearly 2 miles in a W.N.W. direction. It is about $\frac{1}{2}$ of a mile wide at the entrance, where is a depth of 18 to 7 fathoms, and decreases rapidly in width and depth towards its head; its western part is consequently only available for vessels of light draught. As this bay is quite exposed to easterly winds, it should only be frequented when the wind is from southward and westward; it is a convenient stopping place for awaiting the turn of the tide off Race islets.

The usual place of anchorage for ordinary vessels is in 7 fathoms with cape Calver, the south point of the bay, bearing S.E. by S., distant about $\frac{1}{2}$ a mile. The holding ground is good. Close to the cape is a small patch of 8 fathoms.

In the narrow part of the bay is a depth of 4 to 2 fathoms, and this gradually decreases to 7 feet at its head. The upper part of the bay is therefore rarely visited except by boats.

Parry Bay.—Immediately northward of William head, the north point of Pedder bay, is Parry bay, an open roadstead facing the east. Its north point, Albert head, is moderately high and slopes to the sea, it is also bare of trees at its extremity but wooded immediately behind; at a cable's length from it is a reef. William head somewhat resembles it, but is lower. The depth off these headlands is too great for anchorage.

The soundings in Parry bay gradually decrease from 20 fathoms at $\frac{1}{2}$ of a mile from the shore, to 6 and 5 fathoms at $1\frac{1}{2}$ cable's length from the beach. The usual anchorage is in 9 fathoms with William head bearing S.W. by S., distant from $\frac{1}{2}$ to $\frac{3}{4}$ of a mile. With a south-easterly wind there is ample room to get under way, which a vessel should immediately do, and if not able to round Race islands and proceed to sea, should run for Esquimalt harbour.

The shelter in Parry bay is from westerly winds, and the ground holds well. All winds from eastward, between North and S.E. blow directly in.

ESQUIMALT HARBOUR.—From Albert head the coast trends northward nearly 8 miles to Esquimalt harbour, the space between forming what is known as Royal Roads. Here vessels may anchor in 10 to 12 fathoms, at about $\frac{1}{2}$ of a mile from the shore, and find good shelter from all winds

except those from eastward and south-eastward. A berth that is recommended is at about a mile S.S.E. $\frac{1}{2}$ E. from Fisgard light, as the harbour will then be open and can be entered if necessary.

The lighthouse on Fisgard island, on the western side of entrance to Esquimalt harbour, shows a *fixed* light at 65 feet above the sea, visible 10 miles. The light shows *white* between the bearings from it of S. $\frac{1}{2}$ E., easterly, to S.E. by E. $\frac{1}{2}$ E., and *red* from S.E. by E. $\frac{1}{2}$ E. easterly and northerly to N. by W. $\frac{1}{2}$ W.; hence when approaching the harbour a vessel is in safety so long as the white light is visible.

"Esquimalt harbour" is a safe and excellent anchorage for ships of any size, and with the aid of the light on Fisgard island may be entered at all times with great facility. The entrance, which bears North 9 $\frac{1}{2}$ miles from the lighthouse on Great Race island, is between Fisgard island and Duntze head, and is 8 cables' in breadth, opening out immediately within.

The only dangers are the Scrogg rocks which lie on the eastern side, S.S.E., 8 cables from Duntze head, and cover at three-quarters flood. Inskip islands kept well open of the head leads clear to the westward of them, but the best mark for entering with a leading wind is Thetis cottage, a conspicuous white building on Dyke point, just upon or on with the western Inskip rock, bearing N. by W. $\frac{1}{2}$ W., which leads in mid channel.

Fisgard island should not be passed within less than a cable's length, keeping just without the kelp, which extends about $\frac{1}{2}$ a cable eastward of it, for a rock with 7 feet water over it lies $\frac{1}{2}$ of a cable north-east of the lighthouse.

Vessels entering the harbour at night with a strong wind after them should take care to shorten sail in time, as the space for rounding to is somewhat limited; and it is desirable to moor if any stay is intended, as the winds are changeable.

The best time to leave the harbour is early in the morning, when either a calm or light land wind may be expected; there is little strength of tide in the harbour, or for some distance without, and it sets fairly in and out.

The strongest and most frequent gales blow from S.W. and S.E. which are leading winds in, but rarely from N.W. The S.W. is a summer wind, generally fresh, and brings fine weather, unless it blows a gale. S.E. winds may be looked for during the winter months, or between November and March, and generally a strong gale once in a month with rain and thick weather. The N.E. wind rarely blows with much strength, and always brings fine clear weather; a direct South wind, to which some parts of the harbour are open, seldom blows, and there is never sufficient swell to render the anchorage inconvenient.

Whale Rock.—The Whale rock with only 7 feet on it at low water, lies W. $\frac{1}{2}$ N., 2 cables from Inskip islands, or nearly midway between them and the western shore of the harbour. This rock is of small extent, and not marked by kelp; it has a clear passage on either side, that to the eastward being the widest. Yew and Rodd points, just touching, point to the rock; Yew point, just touching the lighthouse on Fisgard island, S. by E. $\frac{1}{2}$ E., leads nearly a cable's length westward; and when Ashe head is well shut in by Inskip islands, a vessel will be clear to the northward.

• The instructions for Esquimalt and Victoria harbours and the coast to Chatham islands are from the Vancouver Island Pilot, 1864.

Anchorage.—The most convenient anchorage is in Constance cove, on the eastern side of the harbour, immediately round Duntze head, the general depth being 6 fathoms, and the holding ground good; there is, however, safe anchorage in any part of the harbour, in not less than $4\frac{1}{2}$ fathoms, as far northward as Dyke point. A cable's length above this point the water shoals to 8 fathoms, and from thence to the head of the harbour is a flat with only a few feet on it at low water.

Thetis cove in Plumper bay, on the eastern side, immediately north of Constance cove, is a snug anchorage, with the harbour entrance just shut in by Inskip rocks, in $4\frac{1}{2}$ fathoms; but vessels proceeding above these rocks must take care to avoid the Whale rock.

Water may be obtained during the winter months without difficulty from the many streams that empty themselves into the different bays, caused by the great quantity of rain which usually falls at that season; but in summer watering is a tedious process, and boats must be sent either to Rowe stream, at the head of the harbour, or to the salt lagoon just outside the entrance. Both offer difficulties, unless at or near high water.

Water, however, might be conveyed at all seasons, and at a trifling expense, from the chain of lakes just over the western side of the harbour, near Colwood farm.

VICTORIA HARBOUR is a little more than 2 miles eastward of Esquimalt, with its entrance between Ogden and MacLaughlin points. Macaulay or Sailor point, a remarkable projection nearly midway between the two harbours, is a bare flat point about 80 feet high, showing as a yellow clay cliff, worn by the action of the sea and weather into a rounded nob at the extreme. The coast on either side of this point for a mile is fringed with sunken rocks, and is dangerous for boats in bad weather, many fatal accidents having occurred.

The entrance to this harbour is shoal, narrow, and intricate, and with S.W. or S.E. gales a heavy rolling swell sets on the coast, which renders the anchorage outside unsafe, while vessels of burthen cannot run in for shelter unless at or near high water. Vessels drawing 14 or 15 feet water may, under ordinary circumstances, enter at such times of tide, and ships drawing 17 feet have entered, though only at the top of spring tides.

The channel is buoyed, but it is necessary to take a pilot, and the space is so confined and tortuous—that a long ship has considerable difficulty in making the necessary turn; a large percentage of vessels entering the port, small as well as large, constantly run aground from these causes, or from trying to enter at an improper time of tide, or neglecting to take a pilot. Such accidents, however, are seldom attended with more than delay and inconvenience, as the shoalest and most intricate part of the passage is sheltered; when within, the port is perfectly land-locked, and vessels may lie in from 14 to 18 feet at low water, but the harbour accommodation is limited.

Doubtless Victoria harbour is susceptible of improvement by artificial means, though it is improbable that it can ever be made a safe and convenient port of entry for vessels of even moderate tonnage, at all times of tide and weather, and it appears not a little remarkable that with the excellent harbour of Esquimalt within 2 miles, Victoria should have been continued as the commercial port of a rising colony, whose interests cannot but suffer materially from the risks and delays which shipping must encounter in approaching the commercial capital.

Victoria was selected by the Hudson's bay company as the depôt of their establishments in consequence of the quantity of clear good land in the immediate neighbourhood, and the harbour being sufficiently spacious for the few small vessels in their employ; as a site, in these respects, it was admirably chosen, but it has been a fatal mistake at a later date not to have adopted Esquimalt as the commercial port.

Victoria is a free port, the government site, and the largest and most important town in these colonies. It enjoys a considerable foreign and coasting trade, which is annually increasing. The resident population is upwards of 4000, and the town has made great progress since 1858, when it may be said to have sprung into existence; it now covers a large extent of ground, substantial and handsome stone and brick buildings everywhere replacing the wooden structures first erected.

Along the eastern side of the harbour in front of the town there are about 400 yards of fair wharfage, with a depth of from 10 to 16 feet at low water spring tides. Between Songhies and Limit points on the opposite side of the harbour is a small slip capable of receiving vessels of about 200 tons burthen; larger vessels, however, may heave down alongside the wharves.

Supplies.—Provisions of all kinds, and of an excellent quality, may be procured at nearly the same prices as in England, and water is to be had from a floating tank capable of going outside the harbour, the charge for it being about 4s. 2d. per ton. Supplies for refitting and repairing vessels, except timber, are scarce and expensive, but of fair quality. Coals are plentiful, varying in price from 25 to 40 shillings per ton.

Anchorage.—Vessels anchoring outside the harbour to wait for the tide, or from other causes, should not come within a line between Ogden and MacLaughlin points, the former being W. $\frac{1}{2}$ N., the latter E. $\frac{1}{2}$ S., midway between, or a $\frac{1}{4}$ of a mile from either; this is a good stopping place with off-shore winds or fine weather, but is by no means recommended as a safe anchorage for sailing vessels during the winter months, when bad weather may be looked for with little warning.

Pilots.—There are three or four pilots attached to the port, who keep a good look out for vessels off the entrance. Pilotage is compulsory to all merchant vessels, except coasters, but the charges are moderate.

Brotohy Ledge.—About 4 cables from Holland point, and right in the fairway of vessels entering Victoria harbour from the eastward, lies the Brotohy ledge with 5 feet on its shoalest part; it is covered with kelp, and about a cable in extent within the 5 fathom line. There are 9 fathoms between the ledge and the shore.

A spar buoy, painted *white*, marks this ledge. It lies in 12 feet water with the beacons on Beacon hill in line, bearing N.E. by E.; Odgen point N. $\frac{1}{2}$ W., distant 5 cables; and Holland point N.E. 4 cables. The buoy is occasionally washed away during the heavy winter gales.

Fisgard island lighthouse, the north part of Brothers island, and Macaulay point in line W. $\frac{1}{4}$ N., leads a cable north of the ledge in 9 fathoms, between it and the shore; and the lighthouse, just open southward of Brothers island W. by N. $\frac{1}{2}$ N., leads 2 cables south of the ledge in 21 fathoms.

In entering and leaving Victoria harbour keep either of the above marks on, till past the line of the beacons on Beacon hill in line, when a vessel will be clear of the ledge. Coasters, and those acquainted with the place, usually go north of it.

General Remarks.—After rounding Race island lighthouse at the distance of a mile, the course for Esquimalt harbour is N. $\frac{1}{2}$ W. 8 $\frac{1}{2}$ miles. The light-house on Fisgard island is very conspicuous, and will be seen immediately on rounding the Race islands; a course direct for it will clear all dangers, but attention must be paid to the set of the tides. The ebb runs almost directly from the Haro and neighbouring straits towards the Race islands, and a sailing vessel unless with a commanding wind should give them a berth of more than a mile, and steer N.E. by N. for 8 or 4 miles, before she bears up for the harbour; the flood sets in the opposite direction to the N.E., and with light winds vessels are liable to be carried to the eastward, and if near to the Vancouver island shore, up Haro channel, where the water is generally too deep for anchorage; therefore with the flood the coast of Parry bay should be kept aboard if possible, where good anchorage may be had in moderate weather and with all westerly winds, less than a mile from the shore in 10 fathoms.

By night, when Fisgard island light bears N. by W., a vessel may steer boldly for it. The only precaution necessary is to keep the white light in full view; if it becomes dim or shaded, she is getting too near the shore, and should immediately haul out to the eastward until it is again distinctly seen; the two lights by their bearings will immediately show a vessel how she is being affected by the tides.

Entering Esquimalt harbour, the Fisgard island light should be left from 1 to 2 cables on the port hand; when it bears N.W. by W. $\frac{1}{2}$ W. the light changes from white to red, and shows the latter colour within the harbour; and when it bears S. by W. at a convenient distance, a vessel may anchor in 7 fathoms, or stand into Constance cove if preferred. The Scrogg rocks on the eastern side of the entrance of the harbour must be avoided; they bear E.S.E. from Fisgard island distant nearly 4 cables. If not desiring to enter the harbour at night, good anchorage may be had in Royal roads in 9 fathoms; Fisgard island light bearing N. by W. from $\frac{1}{2}$ a mile to a mile.

The entrance of Victoria harbour being only 2 miles eastward of Esquimalt, the same precautions are necessary as regards the tides. The course from a mile off the Race islands is N. $\frac{1}{2}$ E.; during day-time Christ church, a conspicuous white building with a spire, and standing on an eminence, will be seen shortly after rounding these islands, bearing N. by E.; it should be kept just on the starboard bow. At night or during bad weather it is strongly recommended not to run for this harbour, as it can only be entered at certain stages of the tide, and the anchorage outside is at such times exposed and unsafe, while Royal bay or Esquimalt harbour is always available and safe; but if it is decided to run for Victoria, it must be borne in mind that when Fisgard island light changes from white to red, a vessel will be very near the shore.

The Coast.—The coast from Victoria harbour trends in an easterly direction for 2 miles to Clover point, and is for the most part faced by white sandy cliffs, varying in height from 10 to 80 feet; a sandy beach extends along the whole way, and at a cable's distance off in many places are rocks and foul ground. At 2 cables east of Holland point, and a cable off shore, are the Glimpse reefs, which cover at three-quarters flood, and have 7 fathoms just outside them.

Beacon hill, a gentle rise of the land, 2 cables from the water's edge and a mile east of the harbour, is grassy and bare of trees; its height is 140 feet, and there is a staff or beacon on the summit.

Clover point, at 2 miles eastward of the entrance to Victoria harbour, is low, bare of trees, and projecting; it is steep-to, and off it are some strong tide rips, dangerous to boats in heavy weather. Ross bay, eastward of it, is open, but sometimes used by small craft if waiting for the tide,—there being from 4 to 5 fathoms at 2 cables distance off shore.

Foul bay, nearly a mile north-east of Clover point, is of small extent and filled with rocks. Off its entrance are the Templer rocks, about 4 feet under water, and marked by kelp.

Foul point on the east side of the bay is rocky, but has not less than 4 fathoms at a cable's distance; the land at the back of the point rises to a height of 290 feet, forming a rocky ridge or summit, known as Gonzales hill.

TRIAL ISLANDS.—These are situated nearly $1\frac{1}{4}$ miles eastward from Clover point on the south side of Enterprize channel, are two in number, bare and rocky, but generally appear as one. The south or largest island is 80 feet high, and steep-to at its outer end; the northern one is low, and from it foul ground exists some distance. Strong tide ripples prevail off the southern island especially during the flood, which runs nearly 6 knots at springs just outside it.

Enterprize Channel, between Trial islands and the Vancouver shore, is a narrow, tortuous, but deep channel, much used by steamers and coasters trading to Victoria harbour, as a slight saving of distance is effected, and less tide experienced than by going south of the Trial islands; its length is about a mile, its width in the narrowest place $\frac{1}{4}$ a cable and there are not less than 24 feet in the shoalest part.

McNeil Bay, on the north side of the channel to the eastward of Foul point, is upwards of 8 cables in extent, with from 2 to 6 fathoms water; it is open to the southward, and foul ground exists in its east part, but the bay is much used by small vessels waiting for the tide.

Mouatt Reef, in the eastern part of the channel, 8 cables from Trial island and nearly 2 cables off shore, is about a cable in extent, and covers at a quarter flood; this rock is dangerous for vessels using the Enterprize channel, as it lies just north of the fairway. McNeil farm, just open west of Kitty islet, a bare yellow rock 4 feet high on the east side of McNeil bay, bearing W. $\frac{1}{2}$ N., leads $\frac{1}{4}$ a cable south of the reef; another channel point in line with the west side of the Great chain islet N. by E. $\frac{1}{4}$ E., leads nearly 2 cables east of it.

If bound eastward through the Enterprize channel, when past Foul bay, give Foul point a berth of 2 or 3 cables, and steer for the west side of McNeil bay on a northerly course; approach it close-to, after which steer direct for Kitty islet, and when within $\frac{1}{4}$ a cable of the latter, haul quickly eastward, keeping McNeil farm just open west of Kitty islet, bearing W. $\frac{1}{2}$ N.; this will lead safe through the narrowest part of the channel and south of Mouatt reef. When Channel point and the west side of Big Chain islet come in line N. by E. $\frac{1}{4}$ E. the vessel will be well east of the reef, and may round Gonzales point close-to, proceeding up through any of the inner channels.

GONZALES POINT forms the south-east extremity of Vancouver island. It is a low salient point, rocky, bare of trees, and steep-to on the east side.

OAK BAY.—From Gonzales point, the Vancouver shore trends northward, and at a mile from the point forms a sandy bay which is somewhat less than a mile in extent, and affords fair anchorage near its north part in from 3 to 4 fathoms.

The best anchorage is northward of Mary Todd islet in the south part of the bay. This islet is bare, and about 80 feet high; at 2 cables east of it is Emily rock, 4 feet above high water, and the same distance south from it the Robson reef, which uncovers at low water.

CADBORO BAY, $2\frac{1}{2}$ miles northward of Gonzales point, is about $\frac{1}{2}$ a mile in extent, and open to the south-eastward; no sea, however, rises within it, and there is good anchorage in from 8 to 4 fathoms near the entrance.

The shore from Gonzales point to this bay is low and lightly timbered with dwarf oak and pine trees; northward of Oak bay it is clear of danger at a cable's distance.

Mayor Channel, northward of Gonzales point, and west of Chain islets, is about 2 miles long in a winding direction northward, its breadth in the narrowest part is 8 cables, and the soundings in it vary from 9 to 18 fathoms. The channel is bounded on the west side by Thames shoal and Fiddle reef, and abreast the latter on its opposite side lies Lewis reef. The tide seldom runs more than 8 knots through this channel, and it is the one generally used.

Thames Shoal, of 2 fathoms water, is of small extent, and marked by kelp; it lies nearly $\frac{1}{2}$ a mile N. by E. from Gonzales point, at the south-west part of the Mayor channel. Channel point in line with the west side of Great Chain islet, N. by E. $\frac{1}{2}$ E., leads a cable east of this shoal, and the highest part of Trial island in line with Gonzales point S. $\frac{3}{4}$ W., leads $\frac{1}{2}$ a cable west.

Lee Rock, which only uncovers at low water springs, lies $1\frac{1}{2}$ cables westward of Thames shoal; it is marked by kelp and steep-to on the east side. Between this rock and Thames shoal is Mouatt channel, a cable wide, with from 7 to 9 fathoms.

The highest part of Trial island in line with Gonzales point, S. $\frac{3}{4}$ W., leads midway between Thames shoal and Lee rock; also through the fairway of the north part of Mayor channel between Fiddle and Lewis reefs.

Fiddle Reef, at the north-west extreme of Mayor channel, and upwards of a mile from Gonzales point, is of small extent, and awash at high water spring tides; it may be approached close-to on the east side.

Todd Rock, at 2 cables west of Fiddle reef, in the entrance to Oak bay, covers at two-thirds flood, and is marked by kelp.

Lewis Reef, at the north-east part of Mayor channel, nearly 8 cables south-east of Fiddle reef, and 2 cables west of the Chain islets, covers at high water, and may be approached close-to on the west side. The passage between it and the Chain islets is filled with kelp, but has not less than 2 fathoms.

CHAIN ISLETS, midway between Discovery island and the Vancouver shore, are a bare rocky group, $\frac{1}{2}$ of a mile long in a westerly direction, and $\frac{1}{2}$ a mile wide. The largest, called Great Chain islet, is about a cable in extent and 80 feet above high water; it lies at the south-west side of the group, and its south part may be approached to a cable's distance.

Spencer Ledge, off their east side, at a distance of 2 cables from the easternmost high water rock, is marked by kelp, and has 9 feet on its shoalest part; if going through Hecate passage it requires to be guarded against. Cadboro point, open west of Channel point N.N.W. $\frac{1}{2}$ W., leads a cable east of this ledge through Hecate passage.

Caroline Reef, at the north part of the group, and connected to it by a rocky ledge, is of small extent, and covers at a quarter flood, but is well out of the

track of vessels using any of the channels. Foul ground with from 8 to 4 fathoms, and marked by kelp, exists upwards of a cable west of it.

DISCOVERY and CHATHAM ISLANDS.—Discovery island is 2 miles north-east of Gonzales point, at the junction of the Haro and Fuca straits. It is wooded, about $\frac{1}{2}$ of a mile in extent, and its shores on all sides are bordered by rocks, extending in some places more than 2 cables off. Rudlin bay on its south-east side is filled with rocks, and should not be used by any vessel.

Chatham islands, to the north-west of Discovery island, and separated from it by a narrow boat pass, are of small extent, forming an irregular group, low, wooded, and almost connected with each other at low water, the tide rushing with great strength through the passages between them; their west side is steep-to.

Leading point, at the south extreme, is a bare rocky islet at high water; to the eastward of it is a small boat cove. Channel point, their west extreme, is also bare and steep-to, the tide runs strong past it.

Strong Tide islet, the north-west of these islands, is rocky, about 50 feet high, and wooded; its west side forms the eastern boundary of Baynes channel, and is steep-to; the ebb tide runs very strongly past it, nearly 6 knots at springs.

Refuge cove, on the east side of the Chatham islands, is small, and has 14 fathoms in the centre; coasters or small craft entangled among these islets may find shelter in it. Alpha islet, the easternmost of the group, is bare, and 10 feet above high water; it is steep-to on the east side, but only a boat ought to go westward, or inside it.

Fulford Reef, 8 cables north of the Chatham islands, is about a cable in extent, and covers at three-quarters flood. Vessels using Baynes channel should keep well to the westward to avoid this reef, as the tide sets irregularly in its vicinity.

Hecate and Plumper Passages.—Discovery island is separated from the Chain islets by a passage $\frac{1}{2}$ a mile wide in the narrowest part, forming an apparently clear and wide channel, but near the middle of the south part lies Centre rock, which has only 8 feet over it, and though marked by kelp, this, from the strength of the tides, is often run under, and seldom seen. There is deep passage on either side of this danger, the one to the westward being called Hecate, and the eastern one Plumper passage; the latter is wider and best adapted for large steamers, but the tide sets very strong through both of them.

Cadboro point, open west of Channel point N.N.W. $\frac{1}{2}$ W., leads through Hecate passage in mid-channel, west of Centre rock.

Cadboro point, well shut in north of Leading point N.W. $\frac{1}{2}$ N., leads through Plumper passage in mid-channel, east of Centre rock.

Baynes Channel, between Cadboro point and the Chatham islands, connecting these inner channels with Haro strait, is upwards of a mile long and $\frac{1}{2}$ a mile wide; the soundings in it are irregular, varying from 44 to 30 fathoms, and the tide at springs rushes through it with great velocity, strongest along the eastern side.

The *Five-fathom* shoal lying in the centre of the channel, is not marked by kelp; if wishing to avoid it a vessel has only to keep a little over on either side of mid-channel.

CADBORO POINT, on the Vancouver shore, at the termination of the inner channels, is nearly 8 miles north of Gonzales point, and $\frac{1}{2}$ of a mile west of the Chatham islands. It is about 50 feet high, rocky and bare of trees. A small islet lies just off it, also a reef which covers; in passing do not approach the islet within 2 cables.

The coast west of Cadboro point to Cadboro bay, is low, very much broken, and there are some off-lying rocks. *Jemmy Jones* islet, which is bare and 15 feet above high water, lies 8 cables off shore, midway between the two points; foul ground exists around it for upwards of a cable in some parts, and though there is deep water between it and the shore, none except small craft should go through that passage.

Directions.—None of these inner channels, though deep, should be used except by steamers of moderate size or small craft, unless in cases of necessity. Coasters and small steamers, when taking advantage of them, generally proceed through the Mayor channel. If using this channel, after passing Gonzales point keep the west side of Great Chain islet in line with Channel point N. by E. $\frac{1}{2}$ E. till within 2 cables of the islet, when the vessel will be clear of the Thames shoal, after which haul to the north-west bringing the highest part of Trial island in line with Gonzales point S. $\frac{1}{2}$ W., and with that mark on astern steer N. $\frac{1}{2}$ E., which will lead between the Fiddle and Lewis reefs, and on through Baynes channel, to Haro strait. When past Lewis and Fiddle reefs, a vessel may, if necessary, haul a little to the eastward for the fairway towards Strong Tide islet.

Going through Monatt channel, which is very narrow and seldom used, after rounding Gonzales point at a cable's distance, bring the highest part of Trial island in line with the point, S. $\frac{1}{2}$ W.; keeping this mark on astern, and steering N. $\frac{1}{2}$ E., will lead through clear of danger.

The Hecate and Plumper passages are nearly straight, and better adapted for large steamers than those west of the Chain islets. If using either of them, after passing $\frac{1}{2}$ a mile south of the islets on a north-easterly course, bring the leading marks (page 244) on, and keep them so till northward of the Centre rock, when steer up in mid-channel towards Cadboro point, and through Baynes channel into Haro strait.

Tides.—The high water at full and change is irregular and much influenced by prevailing winds; the greatest rise and fall of tide at Discovery island is 12 feet. During summer months in these channels, the flood stream commences at 11h. 15m. A.M., running with great strength till nearly 9h. P.M., after which but little tide is felt till 4h. A.M. on the following day, when the ebb commences and runs strong till nearly 11h. A.M., the time of low water by the shore.

CONSTANCE BANK, lying in Juan de Fuca strait, nearly 6 miles S.E. by E. $\frac{1}{2}$ E. from Fisgard island lighthouse, 8 miles S. by W. from Trial island, and 7 miles N.E. from Race island lighthouse, is upwards of a mile in extent, and has upon it a depth of 9 to 14 fathoms. A vessel should not anchor on it, as the bottom is rocky.

FONTE BANK: about a mile in extent, with from 8 $\frac{1}{2}$ to 5 fathoms and marked by kelp, lies nearly in the middle of Fuca strait, 6 miles S. $\frac{1}{2}$ W. from Cattle point (San Juan island), 8 miles E. by S. from Discovery island, and 8 miles W. $\frac{1}{2}$ S. from Smith island lighthouse.

This bank ought to be avoided, as there may be less water on it than shown on the chart."

ADMIRALTY INLET, PUGET SOUND, AND HOOD CANAL.

SMITH ISLAND.—On the north-eastern side of the approach to Admiralty inlet is Smith island, which we now proceed to describe because it is an important object for vessels making the inlet either from Rosario strait or from westward. The direct course from Juan de Fuca strait into Admiralty inlet is between this island and the lighthouse on New Dungeness.

Smith island lies at the eastern termination of the strait of Juan de Fuca, within 6 miles of Whidbey island, and 7 miles from the southern entrance to Rosario strait. It is quite small, not occupying half a square mile, and rises regularly from the eastern to the western extremity, where it attains a height of about 55 feet, with an almost perpendicular cliff of clay and gravel. Upon it are or were a few dreary looking trees, but none of great thickness or height, and the surface is covered with a growth of bushes 10 or 12 feet high. There is no fresh water to be found on the island, and at 2 or 8 feet below the surface is a stratum of hard, dry clay with pebbles.

A very small, low islet called Minor, exists at 1 mile north-east of Smith island, and at very low tides is connected with it by a narrow ridge of boulders and rocks. A field of kelp extends westward of Smith island for $1\frac{1}{2}$ miles, and has a width of a mile. When sailing through this field the surveyors found the depth of water very uniform at $6\frac{1}{2}$ fathoms, and in no place got less. The bottom is hard and sandy, and no rocks have been discovered in it. Another smaller field is seen westward of the one just mentioned. Good anchorage is found on the north side of the island, east of the kelp, in from 10 to 5 fathoms, and on the south side, east of the kelp, in from 10 to 8 fathoms, hard bottom. Very deep water is found close to the eastern end of the small islet.

The lighthouse on Smith island shows a *revolving light, flashing every half-minute*, at 90 feet above the sea, visible 15 miles. Its approximate geographical position is lat. $48^{\circ} 19' 1''$, long. $122^{\circ} 50' 2''$. From it Discovery island bears West, distant $16\frac{1}{2}$ miles; Race island light, S.W. by W. $\frac{1}{2}$ W., $26\frac{1}{2}$ miles; New Dungeness light, S.W. by S., $18\frac{1}{2}$ miles; Point Wilson, S.E. $\frac{1}{2}$ S., 11 miles; and cape Colville, the south-west point of the entrance to Rosario strait, N. $\frac{1}{2}$ W., $6\frac{1}{2}$ miles.

Fields of Kelp.—At 8 miles S. $\frac{1}{2}$ E. from Smith island is a field of kelp over a mile long by a mile wide. Through it the soundings range from 6 to 12 fathoms, and the bank stretches off to the E.S.E. for 2 miles, with 10 and 12 fathoms upon it. This locality requires sounding out, as it would prove a great advantage for vessels drifting at the mercy of the currents to know of the existence of such anchoring grounds. The detailed hydrography of all the sheet of water eastward of Race islands will probably develop many interesting features of bottom.

At 8 miles W. $\frac{1}{2}$ S. from Smith island, is another field of kelp nearly a mile in extent, named Fonte bank, mentioned in page 245. The depth of water upon it is very uniform at 5 fathoms. Recent partial examinations show that this field marks the N.E. portion of a bank lying nearly North and South, with

a length of 4 miles, and a breadth of $1\frac{1}{2}$ miles within the limits of the 20-fathom line.

At a mile southward of the south-eastern point of San Juan island, and $8\frac{1}{2}$ miles N.W. by W. $\frac{1}{2}$ W. from Smith island, lies a small field of kelp about $\frac{1}{2}$ a mile square, with 8 feet to 8 fathoms upon it. Recent examinations show that this is connected by a 4-fathom bank with the south-eastern end of San Juan island, and stretches S.S.E. therefrom for $2\frac{1}{2}$ miles, with a breadth of $\frac{1}{4}$ of a mile within the limit of the 10-fathom line. It is named Salmon bank.

All these fields and patches of kelp should be avoided, as they denote rocky bottom; and isolated points of rocks frequently exist among them and escape even a very scrutinizing survey.

ADMIRALTY INLET.—Admiralty inlet, at the south-east extremity of Juan de Fuca strait, may be described as a vast canal, running in a general S.E. by S. direction for 60 miles to the south end of Vashon island. It has for that length an average width of $3\frac{1}{2}$ miles, and then branches into a multitude of arms, which cover an area of about 14 by 22 miles; the general direction of these is S.W. $\frac{3}{4}$ S., and they comprise what is called Puget sound.

At 16 miles from the entrance to the inlet an arm called Hood canal opens upon the western side, and runs 60 miles S. by W., with an average width of $1\frac{1}{2}$ miles. At 25 miles from the entrance of the inlet another arm opens on the eastern side, runs north and north-west behind Whidbey island, forming Possession sound, ports Gardner and Susan, &c., and leads on to the strait of Juan de Fuca through Deception pass, at the north end of Whidbey island, in lat. $48^{\circ} 24\frac{1}{2}'$.

The shores of these inlets are generally bluffs, ranging from 50 to 500 feet in height, with their sides kept bright by the gradual wearing action of the water, and their tops covered with trees and thick undergrowth to their very edges. There is so much sameness in the shores that it requires some acquaintance with the different points to recognize them by their trifling peculiarities. The depth of water in the channels is remarkably great, and it is sometimes difficult to find anchorage sufficiently far from the shore to afford room for getting under way. Many superior harbours are found in every direction, and small settlements are gradually springing up in favourable localities.

Admiralty inlet, Puget sound and Hood canal have an aggregate shore-line of not less than 808 miles, yet the number of dangers known to exist in them is remarkably few.

One of the inlets or arms of Puget sound reaches within 2 miles of the head of Hood canal, and between them lies a large lake. The southern waters of this sound are also within 65 miles, in a direct line, of the Columbia river, at the mouth of the Cowlitz, which is 52 miles from cape Hancock; and within 20 miles of the upper waters of the Chehalis river, which runs into Gray bay. At present the route travelled from the Columbia is by canoes, for 28 miles, up the Cowlitz to the settlement at "Cowlitz landing," (or by horse over a somewhat bad path,) and then by horses or mules to Olympia, 52 miles, over a tolerably level country, and by a road moderately good in summer but bad in winter. The distance can be made in one day with a good horse. From where the road strikes the Chehalis the river is said to be navigable for large boats to Gray harbour. The surveyors judged the stream to be about 100 yards wide. It had apparently plenty of water and a slow current. The Cowlitz has a rapid current, and at a low stage of the water

canoes are poled up its channel; during freshets they are dragged up, the crews clinging to the branches of the trees upon its banks. Two days of labour are then required for the trip, but in summer it is made in one.

The importance of these close relations of the waters of the Columbia river, Puget sound, Admiralty inlet, Gray harbour, and Shoalwater bay, in view of the prosperity of the two Territories, must be manifest without entering into details of the feasibility of their connection by railroads and canals.

We shall not attempt to give in full and explicit detail all the peculiarities of this vast area of waters, but, following the mid-channel courses, will only note generally the objects as they come under the eye of the navigator.

The entrance to the inlet lies between point Partridge (Whidbey island) and point Wilson (on the main) at the entrance to port Townshend. The bearing of the latter point from the former is S.E. by S. $\frac{1}{2}$ S., $4\frac{1}{2}$ miles; and the bluff head lying 2 or 3 miles to the east of this line, and destitute of trees and marked by a lighthouse is Admiralty head, around which the ebb current, and an ebb eddy on the flood, sweeps with force.

The first course inside of the entrance of the inlet is E.S.E., $6\frac{1}{2}$ miles, passing port Townshend on the South, Admiralty head on the North, and changing the course abreast of Marrowstone point.

Point Partridge, the western point of Whidbey island, and directly facing the strait of Juan de Fuca, is very steep and yellow, and flat on the summit, which is covered with spruce, fir, and cedar. The point is so rounding that it is not easily recognized on coming from westward, but from southward and northward, it is well marked and prominent. Its face is composed of loose sand, which, being blown up the hill by the strong west winds, has formed a very peculiar ridge on the outer face of the top. This is so narrow that it can hardly be travelled, and in many places it is 85 feet above the ground inside; yet, being overgrown with bushes, the ridge is now permanent.

The highest part of the point is about 260 feet above low water. The approximate geographical position of the southern part of the point is lat. $48^{\circ} 12' 59''$, long. $122^{\circ} 45' 7''$. From point Wilson it bears N.W. by N. $\frac{1}{2}$ N., $4\frac{1}{2}$ miles; and from Admiralty head lighthouse N.W. by W. $\frac{3}{4}$ W., $5\frac{1}{2}$ miles.

Port Townshend.—This harbour is favourably situated at the termination of the strait of Juan de Fuca, at the outlet of the waters of Admiralty inlet, Puget sound, &c., and in proximity to the great inland waters of British Columbia. The entrance lies between point Wilson and Marrowstone point, the latter bearing E.S.E. $8\frac{1}{2}$ miles from the former. Upon this line, and even outside of it, lies a bank extending two-thirds of the distance from Marrowstone point, and having upon it from 6 to 15 fathoms, with hard, sandy bottom. Inside of point Wilson, which is composed of low, sandy hillocks, as heretofore described, lies another low point called point Hudson, distant $1\frac{1}{2}$ miles S.E. by S. $\frac{1}{2}$ S.

Starting from the entrance line, about $1\frac{1}{2}$ miles from Marrowstone point, the mid-channel course of the bay is S.S.W., 3 miles, with an average width of 2 miles; thence S.E. $\frac{1}{2}$ S. for $8\frac{1}{2}$ miles, with an average width of $1\frac{1}{2}$ miles. The depth of water throughout is very regular, and ranges from 8 to 15 fathoms, with soft, muddy bottom inside of point Hudson. Vessels coming from the strait steer for point Hudson, as soon as it is opened by point Wilson, passing the latter close, as 20 fathoms are found 100 or 200 yards off it. Upon approaching point Hudson, and when within $\frac{1}{2}$ a mile of it, gradually keep away about a $\frac{1}{2}$ of a mile in from 5 to 10 fathoms, and, as it opens, run

quite close, with the summer wind off shore, to save making a tack; keep along $\frac{1}{2}$ a mile to the town situated under the Prairie bluff, and anchor anywhere off the end of the wharf, in 10 to 12 fathoms, about a $\frac{1}{2}$ of a mile from shore. In winter anchor further out, to clear point Hudson in getting under way with a south-easter.

When coming down the inlet, bound into the bay, with the current ebb, pass Marrowstone point nearly $\frac{1}{2}$ of a mile before heading in for the town, and so avoid a very strong eddy which comes out of the bay along the bluff shore west of this point. If the wind be light and the current strong, pass the point quite close by; run along the outside of the rip, and try to get upon the bank as soon as practicable.

In summer vessels frequently drift about the entrance for days, without a breath of wind, and in very strong currents.

Tides.—The corrected establishment of the port is at 8h. 49m.; the mean rise and fall of tides is 4.6 feet, of springs 5.5 feet, and of neaps 4 feet.

The geographical position of the station of the Coast Survey, upon point Wilson, is lat. $48^{\circ} 8' 48''$, long. $122^{\circ} 44' 49''$; and the position of the station on the extremity of point Hudson, is lat. $48^{\circ} 7' 6.7''$, long. $122^{\circ} 44' 25.8''$; hence point Hudson is about $1' 25''$ west of Telegraph hill, San Francisco.

The town of port Townshend has increased very much since the discovery of gold on Fraser river. No fresh water (1862) is to be had, but vessels can obtain a small supply near the military post. Some fine farms, lie near the town, and vegetables are plentiful at reasonable prices. The place was noted for the rough character of its "beach combers."

A military post has been established on the bluff, $2\frac{1}{2}$ miles S. by W. from the town, and on a site which commands one of the most beautiful views in these waters, having the bluff and varied shores of the bay on either hand; Admiralty head, 6 miles distant, in the middle ground; several distant, wooded ridges, and in the back ground the snow-covered double summit of mount Baker, 10,900 feet in height, with the mouth of the crater distinctly visible between the peaks, and at times emitting vast volumes of smoke. The elevation of the line of perpetual snow upon this mountain is 8145 (?) feet.

On the east side of the bay, abreast of the town, lies a long sand spit, nearly closing the north entrance to Kilisnoet harbour, which runs parallel to the inlet, and is separated by an island 1 mile wide and 6 miles long. At high tide this harbour communicates by a crooked boat channel, with Oak bay at the south end.

At the head of port Townshend is a narrow channel opening into a large flat, bounded by a low, sandy beach, separating it from Oak bay. The Indians frequently use this as a portage.

The shores are generally bluffs, about 120 feet high, and covered with wood, except behind the town. Between the town and fort Townshend are two low pieces of grass and sand beach, backed by marsh and ponds. The 5-fathom curve extends but a few hundred yards from any part of the shores. A small patch of kelp lies off the southern point of Prairie bluff, and another off the north face of Marrowstone bluff.

Marrowstone point is a low sandy point stretching 800 yards eastward from the base of the bluff, and forming an indentation on its southern face, where anchorage may be had in 12 fathoms, with a current or eddy invariably running ebb. Small craft coming out of the inlet with a head wind can easily take advantage of this for 2 or 3 miles above the point.

Admiralty head.—Abreast of the entrance to port Townshend, is a perpendicular cliff 80 feet high, falling on the eastern side to a low, pebbly shore, which runs 2 miles to the E.N.E. and strikes the high cliffs on the eastern side of the inlet. Behind this beach is a large lagoon, and off it is Admiralty bay, with hard, sandy bottom, in irregular ridges, and a depth of 15 to 25 fathoms of water. A strong current always makes out of the bay, and it is exposed to the full sweep of south-easters. The current is so strong that a vessel rides to it, and consequently lies in the trough of the sea.

The lighthouse on Admiralty head consists of a keeper's dwelling, with a tower rising through the roof at one end; both are painted white, and the iron lantern surmounting the tower is painted red. The height of the tower from the base to the lantern is 41 feet, and the elevation of the light above the mean level of the inlet is 119 feet. The light is *fixed*, and visible about 17 miles. Its geographical position is, lat. $48^{\circ} 9' 22''$, long. $122^{\circ} 40' 8''$. It illuminates an arc of 270° of the horizon, and commands Admiralty inlet and the approaches. From point Wilson it bears N.E. by E., distant $8\frac{1}{2}$ miles; from Marrowstone point N. by W. $\frac{1}{2}$ W., distant $8\frac{1}{2}$ miles; from New Dungeness light N. 78° E., distant $17\frac{1}{2}$ miles; and from point Partridge S. 60° E., distant $5\frac{1}{2}$ miles.

Starting from abreast Marrowstone point the mid-channel course up Admiralty inlet runs S.E. by S. $\frac{1}{2}$ S. for 7 miles. The shores on either hand are bluffs of apparently uniform height, covered with trees. After running thus about 5 miles there will be passed, on the eastern shore, a low point, with one or two clumps of trees and bushes, to which has been given the name Bush point. On the western shore is a rounding bluff point 1 mile north of the point which forms the north-east part of Oak bay; off this point is good anchorage in 12 or 15 fathoms. The peculiar geological formations found in the vicinity suggested the designation Nodule point, which it now bears. The high bold headland, several miles directly ahead, is Foulweather bluff, and that to the E.S.E. destitute of trees, except one large clump, which marks it conspicuously from this direction, is Double bluff. The deep indentation between it and Bush point, with low land in the rear, is Mutiny bay, in the northern part of which exists a narrow bank of 11 fathoms, affording an excellent fishing ground. At the end of the course Oak bay opens to the westward, and stretches towards the waters of port Townshend. It has bluff shores nearly all around it, those on the south-west face being limestone; but Basalt point at the south, derives its name from its geological structure. The depth of water is 5 to 15 fathoms, except N.N.W. of Basalt point, where it reaches 25 and 30 fathoms. The length of the bay is 3 miles, and its average width about $1\frac{1}{2}$ miles. In beating out of the inlet, with a favourable current, vessels must not attempt to work to this bay for the sake of a long tack.

The opening west of Foulweather bluff is Hood canal (subsequently mentioned). Vessels bound into it keep close to the western shore of the bluff, and pass two low points lying near together. The water off them is deep. Off the north face of Foulweather bluff, for nearly a mile, a depth of less than 15 fathoms may be found. Kelp exists under the face of the bluff, and vessels may pass around it in 6 and 7 fathoms. The bottom along the edge of the kelp is rocky. On the west side of the entrance to Hood canal is port Ludlow, which will be described hereafter.

The next or third course up the inlet is E.S.E. for 10 miles, passing on

the eastward Double bluff, which stretches north-eastward for a mile, and rises 800 or 400 feet, having its top covered with wood. The bluff running also to the northward forms Useless bay. This has deep water over the greater portion of it, with a large shallow bay called Deer lagoon at its head. The high bluff forming the southern point of Useless bay is Satchel head. A similar bluff lies 2 miles E. by S. of it. These form the southern extremity of Whidbey island, in latitude $47^{\circ} 54'$, and are the turning points into Possession sound.

The two heads are about 800 feet high, covered with wood, and separated by a depression, which is in part overflowed at high tide, and then presents the appearance of a small bay. From the eastern head round the western, and a mile toward Useless bay, the low-water line makes out $\frac{1}{2}$ a mile, the shore being bare where some recent maps have deep water. For nearly a mile south of both heads a depth of 8 and 10 fathoms and smooth sandy bottom can be found. The surveyors found, when anchored for several days off the eastern head, a strong under current running into Possession sound, and an upper current setting to the westward, at all tides. Vancouver makes mention of the shoal, and states that beating into the inlet he stood on the bank until he got 5 fathoms, but want of time precluded his examining it.

On the western side of the last mid-channel course is Foulweather bluff (already noticed,) which is perpendicular on its N.N.W. face, and about 225 feet high, with heavy firs upon its summit. It slopes towards the east to a bluff 40 feet high, but is steep on the side next to Hood canal. The low point 4 miles eastward of it is No point, making well out, and destitute of trees or bushes. Between it and Foulweather bluff is a deep bight, and the distance across the neck to Hood canal is only $\frac{1}{2}$ of a mile in one part, marked by the track of a recent tornado (1862) that has twisted off and uprooted firs of 8 and 4 feet diameter. On the south side of No point is good anchorage in 10 fathoms; and thence the western shore runs nearly straight S.E. by S. for 10 miles.

At the end of the last course, which carried us 8 miles beyond No point, the inlet expands to a width of 7 miles. A course E.N.E. for $8\frac{1}{2}$ miles carries to the entrance of Possession sound, the first 6 miles through which run N. $\frac{1}{2}$ W., with a width of 2 miles and bluff shores; it then turns to the north-westward to port Gardner. The water is deep in the entrance, and affords no anchorage. The low point on the shore, 4 miles after entering, is point Elliott, and the bay opening to the north-east receives the Sinahomish or Scaget river.

The next, or fourth, mid-channel course up the inlet is S.S.E. for 21 miles to Allen bank, which lies a mile off the north end of Vashon island. Five miles on this course, or 7 from No point, brings us to an excellent little harbour on the western side of the inlet, called Apple Tree cove, having a low point on the north side, with a soft mud flat extending several hundred yards up the inlet. A depth of from 5 to 12 fathoms on sticky bottom are found off it and in the cove. There is no fresh water in the vicinity, but very good timber may be procured suitable for boats spars and booms.

On the eastern shore of the inlet, abreast of Apple Tree cove, are two low points, a mile apart, making out from the bluff. The indentation between them forms a good though small anchorage, and the chances are good for fresh water at high tide. The southern point is named point Wells, the northern point Edmund. The inlet is here only 8 miles wide, and continues

so to point Jefferson, 2 miles southward of Apple Tree cove. This is a moderately low, straight bluff, with the ground rising behind it, and covered with timber. Stretching broad off its eastern face for $\frac{1}{4}$ of a mile is a 9-fathom shoal, which affords capital anchorage for vessels when drifting with light airs and adverse currents.

Ports Madison and Orchard.—Point Jefferson is the northern side of the entrance to this port, which runs 8 miles W.S.W., with an average width of 2 miles and a large depth of water, except under point Jefferson, where anchorage may be had in 10 and 15 fathoms, hard sandy bottom, with patches of kelp inshore.

The south-east point of the entrance is low and sandy, making out from high wooded ground. One mile west of it is the narrow entrance to a natural canal, upon which, in full view, are situated the port Madison saw-mills. At the S.W. part of the bay is the very narrow entrance to port Orchard. The channel is somewhat crooked, but it has 3 and 4 fathoms water in it. On the western side of this entrance are some white patches of beach, formed by clam shells. In 1857 an Indian village was situated here, and an Indian sub-agency. Both sides of the entrance are bluffs. Vessels not well acquainted with the channel must enter under easy sail, and keep a lead going on each side of the vessel to ascertain where the deepest water lies. After getting through give the point, 1 mile off on the western side, a berth of nearly $\frac{1}{4}$ a mile, to avoid a shoal which makes out east from it. Thence it is plain sailing in 15 to 25 fathoms of water. After passing the first point an arm opens to the N.W., and many vessels load there with spars. Ten miles up the southern channel is, or was, a saw-mill. In coming out of this port vessels should not trust the southern entrance, but leave as they entered. See subsequent remarks under heading "Restoration point".

Bainbridge island lies between port Orchard, port Madison, and Admiralty inlet. It is 8 or 9 miles long by $2\frac{1}{2}$ in breadth, and its general direction is S.E. by S. A few loggers' huts stand on the western side and the Madison saw-mill at the north end. On the S.E. part it is indented by two small harbours.

Duwamish Bay.—Abreast of port Madison the eastern shore of the inlet retreats and there receives several small streams of water, but it gradually makes out into a very long, low sand point, called West point, which forms the extreme north-west part of the entrance to Duwamish bay. The bay runs E. by S. $6\frac{1}{2}$ miles and has a width of 2 miles. To the south point, called Battery point, which is low and bare, with a curiously shaped mound rising sharply behind it, the course is about S.E. by S., and distant $4\frac{1}{2}$ miles. Under West point there is anchorage in 10 to 15 fathoms after getting towards the bluff, but on the north side of the point the water is very deep. Through the centre of the bay the depth ranges from 86 to 40 fathoms. On the north side of Battery point a vessel anchoring in 20 fathoms cannot have a greater scope of chain than 85 fathoms without being too close to the shore. When the surveyors anchored there in 18 fathoms and veered to 25 fathoms of chain the vessel's stern was in $2\frac{1}{2}$ fathoms. The beach is smooth and very regular, being composed of sand and gravel. On this side of Battery point is the deserted town of Alki, (the Indian phrase for "by and by.") The town has had several names, but there is nothing about it to command trade.

The bluff head within the bay, 2 miles N.N.E. of Battery point, is Duwamish head. It is steep, about 150 feet high, covered with timber, and

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the beach at low water stretches out over a $\frac{1}{4}$ of a mile N.N.W. from it. The head of the bay receives the Duwamish river, and for 1 or 2 miles is an extensive flat, bare at low water.

The town of Seattle is on a small point at the N.E. part of the bay, a little over 5 miles inside of West point. It consists of a few houses and stores, a church, and a small saw-mill; and a number of university buildings are to be erected, (1862.) It has but little trade.

Seattle has been proposed as the terminus of the northern trans-continental railroad, penetrating the Cascade mountains by the Yakima pass, and thereby making the line 140 miles shorter than by the Columbia river pass, which is remarkably favourable, whilst the former is only possibly practicable.

The usual anchorage is directly off the wharf in 10 to 15 fathoms water, with the large white house on the extreme point bearing about East, or E. by S., and at a distance from the beach of about 500 yards. This position will enable a vessel to work out well by making the first tack to the southward towards the flat. If it be high water this flat cannot be distinguished, and the lead must be kept going. When a depth of 15 fathoms is struck go about, for it shoals to 8 fathoms very suddenly, and keeping on would soon bring up a vessel on the flat. If the current be ebb, vessels bound out should stand well into the inlet; and if bound up, work close under and around Duwamish head to Battery point. If the current be flood, vessels bound out should work under the north shore, and close to West point; if bound up, work under the north shore about $8\frac{1}{4}$ miles to Magnolia bluff, beyond a low marshy indentation in the shore, or until they can fetch well clear of Battery point.

There is said to be some good agricultural prairie land on the Duwamish river. Some distance up it is connected with lake Washington, which is reported to be 25 miles long and several miles broad, with islands in it; it is but a few miles in a direct line east of Seattle. Another small lake exists about a mile back from the beach, a mile west of Seattle; this is reached by a trail.

Restoration Point.—From the S.E. point of port Madison to this point the shore is bluff and somewhat irregular, and is indented first by Eagle harbour, having a long pebbly spit making out 800 or 400 yard. S.E. from its north point; and next, at point Restoration, by Blakely harbour, having off its entrance a large rock, 15 feet high, with deep water all round it. The rock bears nearly N.N.W., $\frac{3}{4}$ of a mile from the point, and the bottom between is irregular, the depth ranging from 20 to 40 fathoms. Blakely harbour is only a $\frac{1}{4}$ of a mile wide and $\frac{1}{4}$ long, with 18 fathoms sticky bottom at its mouth, and shoaling gradually inside, but most on the south side.

Eagle harbour is larger and more commodious than Blakely.

Restoration point is in some respects very peculiar; no other in these waters, except Battery point, presenting the same formation. For 800 yards it is flat, about 10 feet above high water, and has a foot depth of soil covered with grass over a limestone rock, upheaved nearly on edge, the direction of the strata pointing toward Battery point or a little south of it. Inshore it rises up sharply about 100 feet, its sides covered with grass and the summit with fir trees. Around the whole S.E. face of the point these peculiarities exist. On the upper levels of the high land adjacent are several small lakes of water.

From the extremity of the point a ledge, bare at low tides, makes out 800 yards, but the depth is 6 fathoms at 100 yards from its extremity, and

16 fathoms at a $\frac{1}{4}$ of a mile. On the tail of this ledge the United States sloop-of-war *Decatur* struck in 1855. Anchorage may be had S.S.E. of the point, distant a $\frac{1}{4}$ of a mile in 15 fathoms, sticky bottom; a rule for finding anchorage, is to bring the rock north of it to range just over and inside of the point. Kelp exists along the southern face.

The geographical position of the triangulation station of the Coast Survey upon this point is, lat. $47^{\circ} 35' 6''$, long. $122^{\circ} 28' 15''$. From this point Battery point bears E. by N. $\frac{1}{4}$ N., distant $2\frac{1}{2}$ miles.

Tides.—The approximate corrected establishment at Restoration point is 4h. 4m. The approximate mean rise and fall of tides is 7.4 feet.

South of Restoration point, Admiralty inlet opens westward for a couple of miles into a bay, in which is situated an island about $\frac{1}{4}$ of a mile in extent, called Blake. From the north-west part of the bay, a narrow crooked pass 8 miles long, leads to the southern part of port Orchard, which spreads out into several arms. The pass is obstructed by rocks and is difficult of navigation. The winds are variable, light, and uncertain at its narrowest part, where it makes a sharp turn, and is only 200 yards wide, with a rushing swirling current. The channel generally used, although narrower than the one just mentioned, is that leading into port Madison.

Our last course brought us to Allen bank, off the north end of Vashon island, with Blake island to the westward, and $\frac{1}{4}$ of a mile distant. This bank is nearly a mile in extent, and has as little as 10 fathoms upon it, with a variable bottom, in some places mud, and in others hard sand. When the surveyors anchored upon it in 11 fathoms the south end of Blake island bore N. 81° W., and the N.W. point of Vashon island S. 5° E. Between the anchorage and Blake island the water regularly deepens to about 18 fathoms in soft mud. This anchorage has already proved of service to vessels losing the wind and having adverse currents. In some recent maps 25 to 30 fathoms are marked in the position of this shoal. The eastern point of Blake island is low and pebbly, and called by the natives Tatagh; under it is anchorage in 17 and 18 fathoms, soft mud. The north-east point of Vashon island is Dolphin point; the north-west point, point Vashon; the point abreast of it is point Southworth; and the mile-wide channel, commencing between the last two points, is Colvos passage, running west of Vashon island.

The main body of Admiralty inlet continues about S.E. for 8 miles, then S.S.W. 8 miles further, with an average width of 2 miles. In this stretch the currents are moderately strong, the chances for anchoring few, and it is sometimes calm while a fine breeze is blowing through Colvos passage.

Brace point lies on the east side of the inlet, N.E. from Dolphin point. The round-topped point having two or three lone fir trees upon it, and situated on the same side of the inlet, 4 miles above Brace point, is called point Pully; the water is very deep close to it on either side. The geographical position of the triangulation station of the Coast Survey on the summit of the mound at point Pully is, lat. $47^{\circ} 27' 7''$, long. $122^{\circ} 22' 21''$.

There is a small bight north of Brace point, and between it and another low point, is an inlet called Fauntleroy cove, having good anchorage in 10 and 12 fathoms, and fresh water is easily obtained in the vicinity. Between Brace point and point Pully two or three small streams of water empty, and another from the valley a mile east of the high bluff at Pully point. Off this valley a flat makes out with deep water at its edge.

Under Dolphin point there is very deep water; but off the north end of the island, near this point, anchorage may be obtained in 14 fathoms, hard bottom.

Colvos passage is the usual, we may say the invariably used ship channel towards Puget sound. It is about a mile wide, with high bluff shores, varied by numerous small, low, sand points making out from the face of the bluff, and having deep water off them. The passage is 11 miles long to the south end of Vashon island, called Dalco point, and it runs with a nearly straight course S. by E. At $1\frac{1}{2}$ miles inside of point Vashon there is a small curve in the shore line called Fern cove, with excellent anchorage in 5 and 10 fathoms. Abreast of Dalco point on the western shore there is a small harbour, with a narrow and shoal entrance, called Gig harbour. Looking out of the passage to the north, mount Baker shows distinctly in clear weather.

Commencement Bay.—When abreast of Dalco point this bay, at the termination of Admiralty inlet, opens to the E.S.E., and over its low back-ground shows the high snow-covered peak of mount Rainier. The general direction of the bay is E. by S. $\frac{1}{2}$ S., with a length of 3 or 4 miles, a width of 2 miles, and a great depth of water up to the line of the extensive flat at its head, which is backed by marsh. There are no settlements upon it (1862).

Vashon island, lying between the southern extremity of Admiralty inlet and Colvos passage, is $11\frac{1}{2}$ miles long, with an average width of $2\frac{1}{2}$ miles. Half-way down on its eastern side lies a curiously shaped peninsula, formed by a narrow, low, sandy neck of land, which makes out into the inlet, and then runs towards the south point of the island. The space between this peninsula and the island is an excellent harbour 4 or 5 miles long, and $\frac{1}{2}$ of a mile wide, having a depth of 5 to 10 fathoms water in it. The south-east face of the peninsula is high and steep, and bordered by water from 40 to 50 fathoms deep.

The island is high, with steep shores, covered with wood and undergrowth. Its surface is marshy in many parts that are quite elevated. The harbour formed by it and the peninsula is known as Quartermaster harbour.

Point Defiance and the Narrows.—The high, sharp yellow bluff facing the south entrance to Colvos passage is called point Defiance, and between it and the western shore pass all the waters of Puget sound. This passage is named the Narrows. Its average width is $\frac{3}{4}$ of a mile, and very uniform; the shores are high, bold, and in some places rocky. For 2 miles to the S.E. its course is a regular curve. The next turn is to the southward, and at a distance of 2 miles in that direction the waters of the sound open ahead, with a narrow pass between the main and Fox island to the west; and a small indentation, backed by low ground, and formed on the south by a small peninsula, on the east. In this bight is anchorage in 15 fathoms, with swirling eddies. On the south face of this peninsula, and outside of the kelp, anchorage may also be had.

PUGET SOUND.—This collection of inlets commences after passing "The Narrows," and covers an area of 14 miles by 22, with a general direction S.W. $\frac{3}{4}$ S. The aggregate shore-line of this sound, and the adjacent part of Admiralty inlet, with Colvos passage, to the north end of Vashon island, is not less than 970 miles. Upon its shores are situated the settlements of Steilacoom, Nisqually, Olympia, and Newmarket.

Steilacoom.—On the eastern shore of Puget sound, 9 miles south of point Defiance, is situated the town or village of Steilacoom, upon a rising bluff. It consists of only a few houses. Fort Steilacoom stands about a mile inland,

upon a piece of gravelly prairie, and roads lead from it to the town and the creek.

The neighbouring country is only moderately well adapted to agriculture except along the bottoms of the small streams.

The usual anchorage is off the small wharf, in 15 fathoms, hard bottom, and about 400 or 500 yards from the shore. An island lying $2\frac{1}{2}$ miles westward of that position is called McNeil, and between it and Fox (Rosario) island, to the northward, there is a passage $1\frac{1}{2}$ miles wide. The passage on the south side of McNeil island, between it and Anderson island, is generally known as Balch passage. It bears about S.W. by W. from the anchorage, and is marked by a small wooded islet in it, called Eagle island, off which lies rocky bottom, and vessels keep closer to the north shore. This passage is the direct channel to Olympia, instead of following the broad one southward of Steilacoom.

The north end of the island, showing to the southward, and $1\frac{1}{2}$ miles from the anchorage, is Kitson island.

One mile north of the anchorage is the mouth of a small stream called the Steilacoom river.

When approaching Steilacoom, or bound direct for Olympia, a patch of kelp, with foul bottom and less than 8 fathoms of water upon it, must be avoided. It bears S.S.E. 1 mile from the south end of Fox island, and N.W. by W. $1\frac{1}{4}$ miles from Steilacoom wharf. The tide-rip upon it and abreast of the town is very great; quite sufficient with a little wind to swamp a small boat. The shores of the main and islands are bold, nearly uniform in height, and covered with trees.

Tides.—The corrected establishment of the port is 4h. 46m. The mean rise and fall of tides is 9.2 feet, of spring tides 11.1 feet, and of neap tides 7.2 feet.

Nisqually, 5 miles south of Steilacoom, and on the same side of the sound, is, at present, a place of no trade or importance. It was one of the early posts of the Hudson Bay Company, and is still occupied by them. An extensive mud flat exists off the mouth of the wide, marshy valley, but the depth of water is very great close to it, and the anchorage room very much contracted. The river Nisqually empties here, and we believe there are two small saw-mills upon it. The name is Indian.

Olympia.—It would be almost useless to attempt to describe the route to Olympia from Steilacoom, as a pilot or a good chart is absolutely necessary in making the passage. The mid-channel course is 21 miles in length, and its width from $\frac{1}{2}$ a mile to $1\frac{1}{4}$ miles.

Olympia is situated at the head of Budd inlet, which is 6 miles long and $\frac{1}{4}$ of a mile wide, and runs nearly South. The shores are steep and wooded, and the head of the bay an immense mud flat behind which is the town. It acquires prospective importance by being the capital of the territory, but especially on account of its proximity to the Columbia river valley, and to the headwaters of the Chehalis. There is a saw-mill at Newmarket, 2 miles south, on the Tumwater, and three others in the vicinity, besides one or two grist-mills.

A depth of 8 fathoms can be carried on the west side of Budd inlet, within $1\frac{1}{4}$ miles of the wharf; and 1 fathom within a mile on the eastern side. Vessels are brought up to the wharf at the highest tides, and then rest in the mud until ready to leave.

The greatest difference between the highest and lowest tides is reported to be about 24 feet, and is doubtless more than this when we compare its position with that of Steilacoom. The approximate corrected establishment is 5h. 8m., and the mean rise and fall of tides 9.2 feet.

The approximate geographical position of the wharf is, lat. $47^{\circ} 8'$ long. $122^{\circ} 55'$.

HOOD CANAL.—The entrance to this arm of Admiralty inlet lies between Basalt point and Foulweather bluff, the latter bearing E. $\frac{1}{4}$ S., distant $8\frac{1}{2}$ miles from the former.

The first mid-channel course is S.E. for 4 miles, pointing directly into port Gamble, at the entrance to which the houses and mill are plainly visible; and passing a high, round, wooded peninsula on the west side of the channel, and connecting to the main by a narrow neck of low sand beach. This is frequently mistaken for an island, and is called Hood head. Between this head and port Gamble the canal changes its course and runs in nearly a straight line S. by W. 40 miles, with an average width of $1\frac{1}{2}$ miles. In latitude $47^{\circ} 21'$ N. it makes an abrupt turn, and runs for 12 or 13 miles about N.E.

Port Ludlow.—Close to Basalt point lie some rocks, with others about $\frac{1}{2}$ a mile S.E., called the Colvos rocks, among which is one 25 feet high, but of small extent. Close in shore, and abreast of this, is a rock just awash at high tide, but between the two runs a channel with 15 fathoms water, having soft, muddy bottom. The bright bluff head $1\frac{1}{2}$ miles S.E. of the Colvos rocks, and about 2 miles S.W. by W. from Foulweather bluff, is Tala point. Half-way between the Colvos rocks and this point is the usual entrance, over a sand bar having $4\frac{1}{2}$ fathoms. The 8-fathom line stretches $\frac{1}{2}$ a mile S.E. of Colvos rocks. If the wind and currents do not suit for this channel, run inside of the Colvos rocks, carrying deep water and 8 fathoms, soft, muddy bottom, anywhere inside of Tala point, even past the saw-mill, if necessary. The general direction of the shore from Basalt point to the saw-mill on the low sand point inside, is S.S.E. $2\frac{1}{2}$ miles. Abreast of Tala point the width of the bay is $\frac{1}{2}$ of a mile, but it gradually contracts to less than $\frac{1}{2}$ a mile at the saw-mill, at which vessels load. Inside of the saw-mill point is an excellent anchorage in 7 and 8 fathoms. About a mile from the mill is an ample water-power, with an available head of 80 feet, but it is not used.

We believe the Pacific Mail Steamship Company were to have established a coal depot here for their Puget sound steamships; but since the breaking out of the Fraser river gold excitement other arrangements have been made.

Of all the small harbours in these waters this has the preference, as it is completely land-locked, and protected from gales from every quarter by the high land and high trees around it. The first steamboat built in these waters was launched here in 1860.

The first rocks off Basalt point lie at the narrow mouth of a small boat harbour, called Mats-mats. The entrance to it is over $\frac{1}{2}$ a mile long, about 100 yards wide, and at the sharp turn obstructed by rocks, which allow a channel of only 8 feet water. Inside, the depth ranges to 2 fathoms, and the extent of the harbour is about $\frac{1}{2}$ of a mile by $\frac{1}{2}$ in breadth.

Port Gamble.—After passing Foulweather bluff keep closer to the eastern shore than to the western, to avoid the strong current passing round the low point which makes out from Hood head. Run for the saw-mill, plainly in sight, on the western side of the entrance to the bay, and when within a mile of it approach the eastern bluff within $\frac{1}{2}$ of a mile, in about 10 or 15 fathoms,

gradually drawing closer in shore, and passing between the outer white and inner black can buoys. At the lowest tides the white one is in 15 feet, the black in 12½, and the small spar buoy between them in mid-channel in 17 feet, but it rarely shows above water at any tide. After passing these buoys the mill bears almost S.S.E. ½ a mile distant. Steer S.E. or half-way between the mill wharf and the east point, pass to the east of the white spar buoy, which is in 12½ feet, and run through the entrance, passing the wharf at about one-third of the distance between the points. Do not round up to the eastward, as a shoal makes out almost parallel with the point. It may be here noticed that these buoys were made and placed by the Puget Mill Company, for the benefit of vessels trading to the port.

If the wind be ahead while beating up, it will be impossible for a large vessel to get in, as the channel is ½ a mile long, and not over 100 yards wide at the narrowest part. Anchor off the buoys, and drop in with the early flood, or warp in with the last of the ebb. On the shoal forming the western side of the passage 10 feet may be found until up with the white spar buoy.

Inside of the points the bay appears to open well under the eastern one, but the 9-fathom line makes out on a line with the end of the point. On the western side is a crib, around which a shoal has formed—anchor just beyond it in 5 fathoms, soft muddy bottom. The depth of water throughout the bay is from 4 to 9 fathoms, with mud bottom. The length of the bay is 2½ miles, its width ¾ of a mile, and its direction south-east. The shores are steep, but not high, and are bordered by sand and pebble beach, offering capital chances for laying a vessel out. A better place, however, for that purpose, is at the end of the store wharf, especially for vessels with large dead rise.

In summer the wind generally blows into the harbour lightly; in winter the S.E. gales draw directly out. Loaded vessels must warp out in summer, or trust to a light southerly air in the morning, with an ebb tide. None but small, smart working vessels can beat out, and few of those have done so within the channel limits.

The approximate geographical position of the eastern point of the entrance is lat. 47° 51' 32", long. 122° 33' 56".

From this place, called Teekalet, (the Indian name of the bay), a road is being constructed (1857) by the Mill Company to port Madison.

At about 8 miles from Hood head, on the western side of the canal, is Suquamish harbour. A large sand bank occupies its centre, and extends a mile in length N.N.W., by ½ a mile in width. The approaches to the shoal, which is in part bare, are detected in thick weather by the lead, the soundings decreasing regularly from 20 fathoms. Keep, however, close under the northern shore, which runs 2 miles W.S.W. from the low point called Termination point.

At 14 miles from Hood head the canal curves more to the southward, and then to the S.S.W. around Hazel point, on the west side of which a large arm of the canal makes north for 10 miles, bifurcating near its head. On its western side the eastern spurs of the Olympus range reach its waters, and form the western shore-line of the canal to the great bend. The sharp peak named mount Constance attains an elevation of 7777 feet.

At 2 miles south of Hazel point, and on the eastern side of the canal, is a fine harbour, formerly called Hahainish harbour, but the name has been changed by settlers, who have lately built a small saw-mill there. It is formed by Seabook island on the west, and is about a mile long by ¼ a mile wide, with good bottom in from 10 to 15 fathoms, the depth decreasing to the head.

South of Hahainish harbour Hood canal is slightly contracted in width, but continues in the same general direction to about latitude $47^{\circ} 21' N.$, ("Vancouver's farthest"), where it takes an abrupt turn, and stretches E. by N. $\frac{1}{4}$ N. 4 miles. The width in that part contracts to $\frac{1}{4}$ a mile, and the shores overlap. From this it takes another slight bend, runs N.E. by N. 8 or 9 miles, and reaches within 2 or 3 miles of the northern extremity of Case inlet, an arm of Puget sound. A large lake lies between the inlet and the canal. When Vancouver reached the first sharp turn he thought he saw the termination of the canal, and has plotted it in accordance with that view on his chart, 4 miles beyond the point marked "Vancouver's farthest" on the Admiralty charts. This was, in fact, the highest point to which he carried his boats.

POSSESSION SOUND AND ANCHORAGES.

WHIDBEY ISLAND.—This long crooked island has been already mentioned as lying at the entrance to Admiralty inlet, and forming for a considerable extent its eastern shore. It is about 33 miles long, and so irregular is its outline, that in some places it is not more than a mile broad. The soil is represented to be good, and the timber to be excellent, and it is said that there are also several open plains suitable for grazing purposes. On it are many small villages, and the inhabitants, which are of the Seatchat tribe, are more numerous than in any part of Juan de Fuca strait or Puget sound.

The channel between Whidbey island and the main, named Possession sound, contains several places of excellent anchorage, of which the principal are ports Garduer and Susan, and Penn cove. The water throughout is in general deep, but believed to be not so deep as in Admiralty inlet.

The western shore of Whidbey island is described in our detailed account of Admiralty inlet. We may however observe here, that a survey of it, such as will satisfy the requirements of the increasing trade in Puget sound, has yet to be made and also of Admiralty inlet. It is known that a 10-fathom bank, muddy bottom, exists off point Partridge, its western extremity, but the extent and position of this bank have not been ascertained; it may possibly be a spit running off from the point. Vancouver says:—"When passing at the distance of about a mile from this point, we very suddenly came on a small space of 10 fathoms water, but immediately increased our depth to 20 and 30 fathoms. After advancing a few miles along the eastern shore of the gulf, we found no effect either from the ebb or flood tide, and the wind being light and variable from the northward, at 3h. P.M. we were obliged to anchor in 20 fathoms water, sandy bottom.

FIDALGO ISLAND.—At the north end of Whidbey island, and separated from it by a narrow and dangerous channel, named Deception passage, is Fidalgo island. It has an extent of about 6 miles, and on its eastern side is almost connected to the main, the land between being marshy and traversed only by a narrow channel of no great depth. Mount Erie, in its centre, rises to the height of 1250 feet. On the western side of the island is Burrows bay, which is protected from westerly winds by Allan, Burrows and Young islets. In this bay vessels may anchor in about 10 fathoms and wait for a suitable wind to carry them through Rosario strait.

The country around Fidalgo island presents a very different aspect to that further southward. The shores are composed of steep rugged rocks, whose surface varies considerably in respect to height, and exhibits little more than the barren rock, which in some places produces a little herbage of a dull colour, with a few dwarf trees.

Deception Passage communicates with Possession sound, and is a narrow intricate channel, which, for a considerable distance, is not 40 yards in width, and abounds with rocks above and beneath the surface. These impediments, in addition to the great rapidity and irregularity of the tide, render the passage navigable only for boats or vessels of very small burden. In front of the western entrance is a small islet having a sunken reef off its south side.

POSSESSION SOUND.—This is the extensive sound between Whidbey island and the main, and its principal and indeed only navigable entrance for ships is from Admiralty inlet, between the south end of the island and the main shore, in lat. $47^{\circ} 54'$. On the eastern shore, near the entrance, is the outlet of the Sinahomis river; off which is a small high island, in the middle of the sound, having a depth of 12 to 20 fathoms close to it all round. The shores of the sound are in general regular, and of but moderate elevation, and Vancouver observes:—"We found the shores of the inlet to be straight, compact, and about 2 miles apart. In several places we attempted to land near the upper end, but found ourselves as often repulsed by a flat sandy shoal, which extended directly across. The land there seemed of a swampy nature, was thinly wooded, and through it was the appearance of a shallow rivulet falling into the sea; farther back it was more elevated, and the surrounding country being covered with timber, made us conclude that it was fertile."

At about 9 miles within the entrance of Possession sound is Allan point, the southern extremity of Camano island. This island is nearly 14 miles long, and its upper part is joined to the shore by a tract of swampy land, through which a small stream flows; behind this the country is more elevated, and covered with timber.

Port Susan.—On the east side of Camano island is port Susan, which extends 11 miles to the north-westward, and has deep soundings all over it, excepting at its head, where is the swampy land just noticed, which is fronted by a quantity of kelp.

On the eastern side of the entrance to this port is a small bay, into which flow two excellent streams, but so nearly on a level with the sea, that Vancouver could procure water only at low tide, or at some distance up the brook, which latter was easily effected, as the boats could go up as far as where the fresh water fell from the elevated land.

Port Gardner is on the west side of Camano island, and is merely a reach of Possession sound; in it there is deep water of 80 fathoms, and good shelter from all winds. In the western part of the port there is a deep bay, extending into Whidbey island about 5 miles, the shores of which, with the exception of some rocks off the eastern shore at the entrance, are believed to be clear of sunken dangers. From port Gardner the trend of the sound is towards the N.W., about 8 miles, to Penn cove.

Penn Cove is an inlet on the east side of Whidbey island. It is a very excellent and commodious harbour, and has regular soundings of 10 to 20 fathoms, good holding-ground. The extent of the cove is about 5 miles, and when within there is shelter from all winds. The head of the cove is not more than a mile from Partridge point, the western extremity of the island, so that

the island is here nearly divided. On each point of the harbour Vancouver found, in 1792, a deserted village.

From Penn cove, Possession sound runs northward about 8 miles, and has a very contracted channel, although deep enough for vessels. From the eastern shore an extensive flat runs out nearly over to Whidbey island, and narrows the channel to the width of about $\frac{1}{4}$ of a mile; on this flat there are several islets and rocks. In the northern part of the sound is the entrance to Deception passage; and between Fidalgo island and the main is a narrow tortuous channel over the marshes, leading into Bellingham bay, fit only for boats.

Vancouver (1792) says of Penn cove:—"The surrounding country, for several miles, from most points of view, presented a delightful prospect, consisting chiefly of various meadows, elegantly adorned with clumps of trees; amongst which the oak bore a very considerable proportion, in size from 4 to 6 feet in circumference. In these beautiful pastures, bordering on an expansive sheet of water, the deer were seen playing about in great numbers. Nature had here provided the well-stocked park, and wanted only the assistance of art to constitute that assemblage of surface which is so much sought in other countries, and only to be acquired by an immoderate expense in manual labour. The soil principally consisted of a rich black vegetable mould, lying on a sandy or clayey substratum; the grass, of an excellent quality, grew to the height of 3 feet, and the ferns, which, in the sandy soils, occupied the clear spots, were nearly twice as high. The country in the vicinity of this branch of the sea is, according to Mr. Whidbey's representation, the finest we had yet met with, notwithstanding the very pleasing appearance of many others; its natural productions were luxuriant in the highest degree, and it was, by no means ill supplied with streams of fresh water. The number of its inhabitants he estimated at about 600, which I suppose would exceed the total of all the natives we had before seen; the other parts of the sound did not appear by any means so populous, as we had been visited by one small canoe only, in which were five of the natives, who civilly furnished us with some small fish. The character and appearance of the several tribes here seen did not seem to differ in any material respect from each other, or from those with which we had already met."

In a bay westward of the north point of the entrance to Possession sound, there is a shoal at a short distance from the shore. It is generally visible, and is easily discovered by the soundings gradually decreasing to 10, 7, and 5 fathoms, so that it cannot be considered as any material impediment to the navigation of the bay.

HARO ARCHIPELAGO.

Between the south-west end of Vancouver island and the main is the extensive group of islands known as the Haro Archipelago. It would not be consistent with the limits of the present work to furnish a full detailed description of all the islets composing this archipelago; so numerous are they that an inspection of the charts will alone give an adequate idea of their configuration, and of the winding channels which separate them. We therefore refer our readers to the Admiralty charts (Nos. 2689, 577, 2840, 602,

and 611,) and to the Vancouver island Pilot, publications resulting from the survey of these waters by Captain G. H. Richards, R.N., during the years 1859 to 1866. The latter work contains a complete description of and directions for, every anchorage and navigable channel among the islands.* The following general remarks upon the archipelago are from the report of the U.S. Coast Survey 1862. It is necessary to premise that the islands are separated from the Vancouver shore by a broad and very deep channel known as Haro strait; and from the main land by a passage almost equally broad, but not so deep, named Rosario strait.

HARO STRAIT.—The southern entrance to this strait may be said to lie between Discovery island and the point of San Juan island, nearly north-west and 7 miles distant. Starting from this line and about 8 miles from Discovery island, a course N.W. by N. for 16 miles will run through the first stretch of the strait; thence an abrupt turn is made towards the eastward and the way out can be readily seen between the islands. The next course is N.E. $\frac{1}{2}$ E. for 11 miles; finally, N.N.W. $2\frac{1}{2}$ miles, and a run of 7 miles on that course will carry a vessel into the middle of the gulf of Georgia.

Commencing at the starting point, we have San Juan island to the eastward, and pass it at the distance of $1\frac{1}{2}$ miles. Its mountains rise to 1070 feet, and some of them are only partially covered with wood. The bluffs are very precipitous and inaccessible, and the depth of water close to them is as much as 150 fathoms. The greater extent of the strait is to the westward, stretching off into bays and passages among the islands. Cormorant bay is the only available anchorage about this entrance. It commences at Gordon head, $5\frac{1}{2}$ miles N.W. by W. $\frac{1}{2}$ W. from Discovery island; then stretches westward for 2 miles, and gradually curves to the N.N.W., with a long high bluff, broken and bright, at Cowichin head. Back of the south-west part of the bay rises a bold rocky-topped hill, (named mount Douglas,) which reaches a height of 696 feet. Fresh water is obtainable on the southern shores of the bay. The northern limit of the bay is Darcy island, N. $\frac{1}{2}$ W., 4 miles from Gordon head, and on this course and $1\frac{1}{2}$ miles from the head is Zero rock, a small white rock, showing a few feet above water, with plenty of water around it, but foul bottom and a patch of kelp a few hundred yards N.N.W. of it; $1\frac{1}{2}$ miles westward of it is a sunken rock. In the bay a depth of not over 20 fathoms is found, decreasing irregularly in advancing, but in the southern portion affording capital holding ground in 10 fathoms. At $1\frac{1}{2}$ miles E.S.E. from Gordon head are patches of kelp and foul bottom.†

When $8\frac{1}{2}$ miles within the entrance the width of the strait decreases to $8\frac{1}{2}$ miles, having Darcy island (low and wooded) on the west, with a small islet off its N.E. face, and very large fields of kelp stretching far off the south-east point into the strait. In one of these fields we discovered in 1854 a sharp-pointed rock, which has been named Unit, lying S. 72° E. from the S.E. point of Darcy island, and distant from it $\frac{3}{4}$ of a mile. The small, sharp apex of this rock rises about 8 feet above the very lowest tides. In recent charts deep water is placed around it, and when the coast surveying brig

* We cannot too strongly recommend shipmasters bound to Vancouver island to furnish themselves with these excellent works by Captain Richards, R.N. The charts of Vancouver island and harbours with the inner waters, published by the Admiralty, are in about forty sheets, and the surveys evidence very great care.

† Apparently on Johnstone reef (6 feet under water) of the Admiralty chart, No. 2689.

Fauntleroy beat through the field the existence of this danger was unknown.

Since its discovery several rocks covering a space of $\frac{1}{2}$ a mile square, and bearing S. 72° E. from the S.E. point of Darcy island, have been found. They are marked by a field of kelp, and one point uncovers at the lowest tides. Near mid-channel a depth of 155 fathoms is found.

The island to the eastward, nearly abreast of Darcy island, with a small cove at its southern end, is Henry island, having a high, rocky precipitous front, and a swirling current around it. Further on and to the westward is the south-east end of Sidney island, $1\frac{1}{2}$ miles northward of Darcy island, with the Dot rocks between them, but nearer Sidney island. This island is not high like those on the other side of the channel, and a landing is easily made at any point. The channel here, 10 miles from the entrance, is 2 $\frac{1}{2}$ miles wide; to the eastward it opens beyond the north end of Henry island, with high mountainous islands bounding the view; to the westward lie a couple of long, narrow islands a mile from Sidney islands, and between them and the latter is good anchorage and capital fishing ground for halibut; that near the strait is named Halibut island. The moderately low wooded islands, 3 or 4 miles ahead, and on the western side of the channel, have not been named. Between them runs the inside channel for steamers to the Nanaimo coal mines. The background of the view is occupied by wooded islands, overlapping each other and appearing like a continuous shore. The large high island on the eastern side, 15 miles from the entrance, is Stuart island, and the strait is here contracted to a breadth of only 2 miles, this being the narrowest part. At 2 $\frac{1}{2}$ miles S. 67° W. from the western point of Stuart island, the British surveying steamer *Plumper* found in 1858 a rock covered at a quarter flood, and having irregular bottom around it for the space of $\frac{1}{2}$ a mile with soundings from 5 to 20 fathoms. At a mile N.W. of Stuart island is a depth of 190 fathoms.

Stuart island in many places is very high and precipitous, and covered with timber, but in some parts sparsely. Near its south-west head a perpendicular wall of rock serves also to distinguish it. After passing the western end of this island at the distance of a mile, the channel takes an abrupt turn to the eastward, and the gulf of Georgia is seen. The course now is N.E. $\frac{1}{2}$ E. for 11 miles, having on the north-west side Saturna island, which rises into mountains. Monarch head, near the eastern extremity of this island, stands up perpendicularly nearly 700 feet, but the extreme part of the island, called East point, is a long sloping point, in many places destitute of trees. The small island lying off its north shore is named Tumbo.

On the east side of the strait the waters open well to the south-east, and the islands rise in high hills and mountains. The large island opposite Monarch head, to the south-eastward is named Waldron; it has good anchorage off its south-west side, where the shore-line curves well in. The western point of the island is low and sandy; the southern, called point Disney, is perpendicular, high and rocky. Off its northern face lie two islets, called Skipjack and Penguin; the western one, about a mile from Waldron, is moderately high, and wooded; the eastern is smaller, about 40 feet high, destitute of trees, but covered with grass, and lies a mile east of the former;—between these islets lies a sunken rock, and the current rushes by with great velocity.

When East point (Saturna island) bears N.W. by W. $\frac{3}{4}$ W., 2 miles distant, the west end of Patos island will bear N.N.E., 2 $\frac{1}{2}$ miles; and the

west end of the Sucia group,* E.N.E. $8\frac{1}{2}$ miles; the course out lying N.N.W. between Patos island and East point, which are $2\frac{1}{2}$ miles apart. Seven miles on this course carries to the middle of the gulf of Georgia. Close off East point is found a depth of 120 fathoms, and off Patos island 170 fathoms. All these islands are moderately high and covered with wood. They are rugged and irregular, composed of sandstone and conglomerate, upheaved until the strata are nearly perpendicular in some places, and interspersed with small veins of lignite.

Plumper reef lies S. 66° W., 1 mile from the S.W. point of Sucia; it has less than 2 fathoms upon it, and is marked by a large mass of kelp.

The approximate geographical position of two or three points will serve to check the courses above given. East point of Discovery island, lat. $48^{\circ} 25'$, long. $128^{\circ} 14'$; west point of Stuart island, lat. $48^{\circ} 41' 17.5''$, long. $128^{\circ} 14' 80''$; and west point of Patos island, lat. $48^{\circ} 47' 8''$, long. $122^{\circ} 57' 81''$.

The number of islands and the intricate channels lying between Haro and Rosario straits we shall not attempt to describe. A proper appreciation of them can only be obtained from the chart.

ROSARIO STRAIT.—Rosario strait is the eastern of the two principal channels running through the Haro archipelago, between Vancouver island and the main. Its southern entrance lies N. by E., distant 7 miles from Smith island, and is $4\frac{1}{2}$ miles wide. The western point of the entrance is formed by cape Colville, which runs out from Walmouth hill;† this hill is 450 feet high and on the south-east part of Lopez island. Off this cape lie several rocky islets, with deep water among them and a rushing current. The outer one, named Colville island, is about 50 feet high, rocky, flat-topped, destitute of bush or tree, narrow, and about $\frac{1}{2}$ of a mile in length, east and west; S. 88° E. from it, at a distance of $\frac{1}{2}$ a mile, lies Davidson rock, possibly bare at the lowest tides. A patch of kelp exists upon and around this rock, but the kelp is generally run under the surface of the water by the strength of the current.

The whole southern face of Lopez island is guarded by rocks and reefs. The island itself is very rocky and moderately low.

On the eastern side of the entrance to Rosario strait is a small wooded islet called Deception island, at the mouth of Deception pass, an intricate and very narrow 8-fathom channel, 8 miles long, running between the north end of Whidbey island, and the south end of Fidalgo island. In 1841 the United States brig *Bainbridge* passed through it from the eastward.

When at the entrance to Rosario strait, and $1\frac{1}{2}$ miles from the western side, a line will pass clear of everything from one end of the strait to the other. This course is N. by W. $\frac{1}{2}$ W., and the distance $19\frac{1}{2}$ miles to the north entrance. It passes between Bird and Belle rocks, and almost tangent to point Lawrence, on Orcas island. Taking the courses through the mid-channel we should have the following: N.W. by N. $\frac{3}{4}$ N. for $11\frac{1}{2}$ miles; N. by E. $\frac{3}{4}$ E. for $8\frac{1}{2}$ miles; and N.W. $\frac{1}{2}$ W. for $6\frac{1}{2}$ miles—making a total of $21\frac{1}{2}$ miles.

The shore for the first 2 miles on the western side is moderately high, declining to a point (cape St. Mary,) a $\frac{1}{2}$ of a mile off which lies Kellett ledge,

* Sucia signifies muddy. The harbour on the east side of it has a soft muddy bottom. The Indian name of the island is Choo-sá-nung.

† The Indian name is Noo-chaad-kwum.

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bare at the lowest tides, and having deep water all around it; the ledge is marked by a mass of kelp. Thence the shore makes a deep bend for a mile to the westward, with a low beach and marsh, over which Lopez sound can be seen. This bend is called Davis bay, and has from 6 to 10 fathoms for a mile out, with level sandy bottom. In mid-channel of the strait rise the Bird rocks, about 40 feet high, consisting of three small rocky islets very close together, and running in a north direction. They are somewhat pyramidal in form, and during the summer show yellowish, on account of the parched grass and the colour of the rocks. Abreast of them, on the western side, is Maury passage, a narrow opening into Lopez sound, between the two low rocky heads of Lopez and Decatur islands. The anchorage of Davis bay continues some distance northward of this opening, and abreast of some moderately high white bluffs. N.N.E. $\frac{3}{4}$ of a mile from Bird rocks lies Belle rock, directly in mid-channel of the strait, and from its position very dangerous. It shows 4 feet above the very lowest tides, and is covered by a patch of kelp, which is, however, generally run under by the strength of the currents. The rip upon it can sometimes be seen when the water is smooth, but with light winds and high tides its existence would not be suspected. On all sides of it the water is very deep. The extent of rock above water is about 20 feet square. The surveyors discovered and named this danger in 1854, and while placing a signal upon it noticed that the tide rose nearly $1\frac{1}{2}$ feet while the current was yet running ebb at the rate of 3 miles an hour. Between it and the Bird rocks there is a submarine ridge with plenty of water, but marked by strong eddies.

After passing Deception island on the east side of the entrance, the face of Fidalgo island is high, precipitous, and bare for 2 or 3 miles in a north-west direction; this is called Sares head. It then sweeps to the north, changing to the westward until abreast of and 2 miles from Belle rock. In this deep bay, and lying well off shore, are, first, Williamson rocks, a cluster of rocky islets about 40 feet high, with deep water close around them; from Deception island they bear N.W. $\frac{3}{4}$ W., 3 miles distant, and from Colville island off cape Colville, N.E. 5 miles. Half a mile northward of Williamson rocks is Allan island, which is about $\frac{3}{4}$ of a mile in extent, and about 200 feet high, with its southern face partly bare; a $\frac{1}{4}$ of a mile off its S.W. face lies the Dennis rock, which is never bare, but its position is marked by a patch of kelp.

North of Allan island, and separated from it by a channel a $\frac{1}{4}$ of a mile wide, is Burrows island, $1\frac{1}{2}$ miles long S.E. and N.W. by $\frac{1}{4}$ a mile in breadth. The island is between 600 and 700 feet high, and has a remarkably flat top, is wooded, and may be seen from the strait of Juan de Fuca. At the eastern end of the passage, between the last two islands, is a small one called Young island. Through all the channels formed by these islands a good depth of water exists, and no dangers have been discovered.

The breadth of Rosario strait at Belle rock is $3\frac{1}{4}$ miles; but it is soon contracted by James island, on its western side, and in a N.N.E. direction, opens into a channel called the Bellingham channel, * which is about 2 miles wide at its entrance. A small channel runs from the south entrance to Bellingham channel, to the eastward along the north shore of Fidalgo island

* The Indian name is Tut-segh.

into Padilla bay. Upon Fidalgo island rises mount Erie to a height of 1250 feet, covered with woods, and presenting a flat appearance from certain directions. James island consists of two heads a mile apart, and 250 feet high, but connected by a narrow ridge; the southern head is the higher, and not very heavily timbered;—close to the west of the ridge lies another head, connected with Decatur island by a low sand beach.

Immediately northward of James island is an opening on the west side of the strait between Decatur island and Blakely island, with a depth of 25 fathoms in it, but a rock, covered at a quarter flood, lies exactly in the middle of the entrance. On the east side, $\frac{1}{2}$ a mile up the strait, appears the S.W. point of Cypress island, off which lie rocks and foul bottom for $\frac{1}{2}$ a mile on a line to Burrows island. Around this locality extends a large body of kelp. The southern face of Cypress island consists of alternate perpendicular white cliffs, and sloping ground covered with fern or trees. On its western side, and $1\frac{1}{2}$ miles from the south-west point, is found a snug little harbour called Strawberry bay, * which is formed by the retreating of the shore-line, and an outlying rocky islet called Strawberry or Hautboy island. In this bay excellent anchorage is found in from 6 to 10 fathoms, muddy bottom. Good fresh water is abundant here. A high white cliff is seen to the south of the harbour, from the shores of which rise rapidly the Lake mountains, (1) to an elevation of 1525 feet, and among whose peaks are two large sheets of fresh water. These peaks are very noticeable from the strait of Juan de Fuca, and as they are connected by comparatively low ridges with other hills on the island, they present a saddle-like appearance from the southward and westward.

Abreast of Strawberry island the strait contracts to a width of $1\frac{1}{2}$ miles, where the bold rocky face of Blakely island rises to a height of between 900 and 1000 feet; the greatest elevation of the northern part of the island is 1044 feet. Nearly $\frac{1}{2}$ a mile S.E. from its east face lies a very small low rock called Black rock, and half way between it and the south end of the island is White rock, a $\frac{1}{4}$ of a mile from the shore. In this narrow part of the strait the depth of water is about 60 fathoms, and the current goes through with a roar like the sound of a gale of wind through a forest. When at anchor in 10 fathoms, under the low point $1\frac{1}{2}$ miles north of Strawberry island, the surveyors found the current 4 miles per hour, and swirling so much that the vessel had to be steered to prevent her breaking her sheer. Thence the strait widens northward, and at the north end of Blakely island, 2 miles above Strawberry island, two channels lead to the westward around Obscuration island, which lies between Blakely and Orcas islands; both are narrow, and off the entrance to the southern one lie some sunken rocks, and others above water. Blakely island and Orcas island are $\frac{3}{4}$ of a mile apart.

When in the narrowest part of Rosario strait, a very marked perpendicular rocky peak on the north end of Cypress island, is seen to the north over the low point of Cypress island, and soon shows rising abruptly from the water's edge to a height of 750 feet. It is called Bald peak.† Abreast of it the channel takes the first turn, changing its course to N. by E. $\frac{1}{4}$ E. for $8\frac{1}{2}$ miles.

* The Indian name for Strawberry bay is Tuil-ke-teh-nas.

† The Indian name is Sheh-ung-tlh, signifying the home of the Thunder-bird.

Half a mile off the north end of Cypress island is a small islet covered with trees, and called rock island; N.W. of it are some sunken rocks, but their exact position is not accurately known. The comparatively low island $\frac{1}{2}$ a mile N.N.E. of Cypress is Sinclair island, the highest part of which is towards the eastern end. Off the north-east face of Sinclair island, and stretching $\frac{1}{2}$ a mile, is Panama reef, visible at extreme low tides. It is covered with kelp, which is, however, generally kept under the surface of the water by strong currents. A huge erratic granite boulder is seen at ordinary tides inside of the outer point of the reef, and bears from it S. 70° E., distant 500 yards. From the western point of the island the reef bears exactly North, distant $\frac{1}{2}$ of a mile. On the north side of the island is anchorage in 10 to 15 fathoms $\frac{1}{2}$ a mile off shore.

Three miles from Sinclair island lies Orcas island, on the north-west side of the strait. It is a large island, with a mountain (Entrance mountain) 1120 feet high near its southern end. The point stretching furthest east and coming down to the water is point Lawrence, and the low, treeless islets and reef passed $1\frac{1}{2}$ miles before reaching this point, and lying over $\frac{1}{2}$ a mile off shore, are the Peapods; deep water is found close to them. When upon this same mid-channel course, the island ahead is Lummi island. The southern half of this island is very much higher than the northern, and attains an elevation of 1560 feet. The rock nearly 100 feet high off the highest part of the ridge, and $\frac{1}{2}$ of a mile from shore, is the Lummi rock, and a capital boat harbour is found on its north-west side. A mile off the south end of the island are the Viti rocks, which are about 25 feet high, and have plenty of water around them.

Abreast of point Lawrence the strait is more than 3 miles wide, and it there changes to N.W. $\frac{1}{2}$ W. for $6\frac{1}{2}$ miles to a line joining the Matia group with the north end of Lummi island. From point Lawrence, along the north face of Orcas island, the shore is rocky and precipitous, and rises by two or three plateaux to mount Constitution,* which is less than a mile in-shore and 2428 feet high. The geographical position of mount Constitution, as determined by the Coast Survey in 1854, is lat. 48° 40' 37", long. 122° 49' 1".

The course out from the strait passes on the west some rocky islets called the Sisters, marked by one or two stunted fir trees; then Clark island (with a little islet named Barnes close under its western side,) leaving a channel a mile wide between it and the north shore of Orcas island, with very deep water and no anchorage. Abreast of Clark island, on Lummi island, is a contracted anchorage and shelter from northerly winds under a low point called Village point; the anchorage is in 10 to 15 fathoms, but there is no fresh water, and the large Indian village is now deserted. After passing this point, anchorage may be obtained at $\frac{1}{2}$ a mile from shore in from 8 to 15 fathoms. Close to Clark and Barnes islands the depth is 50 and 60 fathoms, and a very strong current runs near them. The channel between Village point and these islands is 2 miles wide.

W.S.W. from the north end of Lummi island, and 4 miles distant, are three islands very close together, called Matia. At $1\frac{1}{2}$ miles westward from them lies the Sucia islands, consisting of one large and six small islands, with a reef off the north side of the group, and enclosing a beautiful harbour a mile long and $\frac{1}{2}$ a mile wide, opening to the east, and carrying from 10 to

* The Indian name is Sweh-lagh.

15 fathoms sticky, mud bottom. To the westward of this group lies Patos island, and a much smaller one close to its S.W. point; the eastern point of Patos island bears W. $\frac{1}{4}$ S., 9 miles from the north end of Lummi. At 2 or 8 miles N.N.E. from Lummi island opens a shoal bay, backed by low marshy ground, which is covered with trees and swamp undergrowth. Into it one or two mouths of the Lummi river empty. The main entrance of that stream is at the north part of the bay, and can be reached with boats only at high tide. The N.W. boundary of the bay is a low grassy point with a few bushes upon it, called Sandy point; from the north point of Lummi island it bears N. by W. $\frac{1}{4}$ W., distant $2\frac{1}{2}$ miles. Between these two points anchorage may be had in from 4 to 6 fathoms, and the south end of Sandy point should not be approached within less than $\frac{1}{2}$ a mile. Down the east side of Lummi island, which is about a mile in breadth, runs Hale passage, $\frac{1}{2}$ of a mile wide, leading from Bellingham bay.

On the western shore of Hale passage, at $1\frac{1}{2}$ miles E. by S. $\frac{1}{4}$ S. from the north end of Lummi island, is a low sandy point, upon which was established in 1858 a secondary astronomical station of the United States Coast Survey. Its geographical position is lat. $48^{\circ} 44' 2''$, long. $122^{\circ} 40' 37''$, which places the north end of Lummi island in lat. $48^{\circ} 44' 58''$, long. $122^{\circ} 42' 12''$.

The following geographical positions will serve to check the courses and distances given for sailing through Rosario strait:—Matia island, east end, lat. $48^{\circ} 44' 37''$, long. $122^{\circ} 48' 29''$; south end of Strawberry island, lat. $48^{\circ} 38' 34''$, long. $122^{\circ} 48' 27''$; and Colville island, off Lopez island, lat. $48^{\circ} 24' 53''$, long. $122^{\circ} 48' 34''$.

Alden Bank.—From the north point of Lummi island an extensive shoal bears W. by N. $\frac{1}{4}$ N., distant $5\frac{1}{2}$ miles, and N.W. by S. $\frac{1}{4}$ N. $8\frac{1}{2}$ miles from the eastern of the Matia islands. It lies upon the last direct course out of the strait, but has not been completely sounded out. Within the 15-fathom curve it is at least 2 miles square, and may be used where a vessel loses the wind and has a strong adverse current; but the swirls and eddies upon and around it will be very apt to foul the anchor.

The least water found on this bank is $2\frac{1}{2}$ fathoms, and this spot bears N. 35° W., $8\frac{1}{2}$ miles from the eastern islet of the Matia islands.

The following bearings of prominent objects have been taken from about the middle part of Alden bank, eastern end of Matia islands, S.E. by S. $3\frac{1}{2}$ miles; north point of Lummi island, E. by S. $\frac{1}{4}$ S. $5\frac{1}{2}$ miles; and the N.W. point of Sucia islands, with the wooded island of the Shippiacks just open, S.W. $\frac{1}{4}$ S. 4 miles. This position will bring the west side of Clark's island just open on with point Lawrence,

The surveyors in 1857 attempted to reach this bank four or five times, from an anchorage off Hale passage, with anchors, but the currents invariably swept them away from it. Recently it has been anchored upon by the United States Coast Surveying brig *Fauntleroy*.

General Remarks.—The experience of three seasons' surveying in this immediate locality has not increased our relish for navigating these channels in sailing vessels. With plenty of wind no navigation could be better, but in a calm vessels will frequently be jammed close to the rocks, with only a few fathoms inside of their positions, but 40 or 50 outside, and a swirling current that renders towing with boats utterly impossible. Frequently, too, boats have been nearly swamped by the tide rips that exist through them. Off East

point (Saturna island), as an instance, a five-oared whale-boat entirely failed in trying to hold her own against the current, which the surveyors judged to be *rushing* (the only term applicable) at the rate of 7 miles per hour. Throughout Haro strait the roar of the conflicting currents can be heard for miles, and the main current runs frequently 6 miles per hour. No anchorages exist in this channel, except at Cormorant bay; but it is free of known hidden dangers, except Zero rock, Kelp reefs, Unit rock, and the continuation of the reef off Darcy island.* It is 10 miles longer than Rosario strait, and makes a right angle in its course, but is a mile wider, and has much deeper water. Rosario strait is less curved, has several anchorages and known dangerous rocks, and a current of about $1\frac{1}{4}$ miles less per hour. For steamers, either channel, or even some of the intermediate channels, may be used; but for a sailing vessel Rosario passage is preferable, although the total distance from the middle of the strait of Juan de Fuca to the middle of the gulf of Georgia is 5 miles longer. The winds are apt to fail in both channels, and during summer frequent calms prevail.

Once in the gulf of Georgia, through either channel, the 8-mile face and timber-covered bluffs of point Roberts (showing almost as an island) is seen to the north-west. On the west the mountains of Vancouver and its bordering islands rise up precipitously, and on the eastern or main shore a series of wooded cliffs 200 feet high. Far to the eastward the Cascade range is seen rising above intermediate ridges, with the snow-covered summit of mount Baker, which rears its head 10,900 feet above the level of the sea. To the W.N.W. stretch the waters of the gulf of Georgia, 9 miles wide abreast of point Roberts, where it is narrowest, but spreading out to 20 miles, and having a length of 120. A short distance above the 49th parallel it receives Fraser river, (the third great stream of the north-west coast of America), the branches of which spread towards the Cascade range of mountains.

If bound up the gulf, vessels hold well to the eastern shore to avoid the rushing currents, and to take the chances of an anchorage if the wind fail.

GULF OF GEORGIA,

EASTERN SIDE TO FRASER RIVER.

BELLINGHAM BAY.—After leaving Rosario strait, the course upon entering Bellingham channel, southward and eastward of Cypress island, is N.E. for 2 miles. The width is at first 2 miles, it then decreases to a mile upon turning sharp around the S.E. point of Cypress island; to the eastward are seen the bright bluffs of Guemes island. Between these two islands the channel runs about 3 miles on a N. by W. $\frac{1}{4}$ W. course. Abreast of the north end of Guemes island, (which is a steep bluff), and on the west side of the channel, are several small, high, wooded islets, called the Cone islands. The moderately low, wooded island facing the channel is named Sinclair; vessels pass between the south-east point of it and the north end of Guemes island. The island 2 miles to the N.E. is Vendovia. Pass north of Vendovia island, but south of the small islet (off Eliza island), which is 2 miles N.E. by

* For the positions of these, see the chart.

N. from the N.W. point of Vendovia island, and the southern part of Bellingham bay opens to the south-east;—its northern part opens to the N.N.W.

If the current be flood and the wind light, keep close around Guemes and Vendovia islands, so as not to be set past Sinclair island. The low, bare, rocky islets, $1\frac{1}{2}$ miles N.W. of Vendovia, are the Viti rocks; and the point between them and Eliza island is the southern extremity of Lummi island. From the islet last passed, a point on the eastern shore lies nearly North 5 or 6 miles distant. Run past this and follow the trend of the shore for 2 or 3 miles to the deepest part of that part of the bay, when houses, &c., will denote the position of the mines and the villages of Sehome and Whatcom. Half a mile from the shore is capital anchorage in 4 fathoms, soft bottom, and the bay there is very smooth.

The general direction of Bellingham bay is S.E. and N.W.; its width 8 miles and length 14 miles, extending from lat. $48^{\circ} 33'$ to lat. $48^{\circ} 48'$. The depth of water ranges from 8 to 20 fathoms, with good sticky bottom.

We believe there are several companies mining here, but the amount of coal obtained is not great. Its quality is not good, the furnaces producing sometimes as much clinker and ashes in bulk, and half the amount in weight, of the coal put in. Deleterious gas is freely disengaged, and the combustion also evolves clouds of black smoke. In some experiments in 1853, the steamer's furnaces could not, in two attempts, be kept up so as to produce a sufficiency of steam.

The north-west channel into Bellingham bay is between Lummi island and the shore. At rather more than 2 miles from the north end of the island, in a N. by W. direction, is Sandy point, a low point projecting from the main land. From Sandy point to point Whitehorn the general trend of the shore is N.W. $\frac{1}{2}$ W., and the distance 7 miles. The shore is a steep bluff, about 150 feet high, and covered with wood. At Whitehorn point the face of the point is worn away by the action of the sea, and shows bright, with rocks at its base.

BIRCH BAY.—The southern point of this fine bay is point Whitehorn, and the north-west shore is formed by a long rounding high bluff, bearing about N.W. from Whitehorn point, and distant 8 miles. The bay runs N.N.E. $2\frac{1}{2}$ miles, with a width of $1\frac{1}{2}$ miles. The bottom is very uniform, with capital holding-ground of soft mud in from 4 to 10 fathoms. The immediate shores are low, and edged with marshy patches, thick undergrowth, and heavy wood. No directions are necessary for entering, as there is a depth of 15 to 20 fathoms a mile outside, and 10 fathoms water on the line of the entrance. During the heaviest south-east weather no swell is felt here in a properly selected anchorage. Search has been made for fresh water, but none found in the space of more than a mile along its south-eastern side. The approximate geographical position of point Whitehorn is lat. $48^{\circ} 53' 7''$, long. $122^{\circ} 46' 27''$. The Indian name of the point is Tsan-wuch.

DRAYTON HARBOUR.—Passing the bluff N.W. of Birch bay the shore trends about N.N.E. for nearly 8 miles, and terminates in a long, low, sandy point, behind which lies Drayton harbour—a small land-locked bay having a depth of 10 fathoms just inside the entrance, but very shoal over nine-tenths of it. It opens to the north at the extremity of the sand point. With the end of the point bearing N. 60° W., $\frac{1}{2}$ a mile distant, the anchorage would be in 6 fathoms. South of this position it shoals gradually for over $\frac{1}{2}$ a mile to 12 feet, with sticky bottom.

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mile from the shore, and the same depth is found on gradually nearing the end of the low point. The south-east shore of the harbour is flat and marshy, and is not separated by much more than a mile from Birch bay.

In this harbour the United States and British steamers attached to the North-western Boundary Survey were accustomed to anchor (1857). The American commissioner encamped on the bluff about a mile north of the boundary, the site having been selected on account of fresh water, but it has an extensive flat in front.

SEMI-AH-MOO BAY.—This extensive bay stretches 3 or 4 miles to the westward of Drayton harbour, and is bounded on the north by a bluff from 300 to 400 feet high, covered with fir. The bottom is very regular, and the depth ranges from 10 fathoms soft, about 2 miles south of the bluffs, to 3 fathoms within $\frac{1}{2}$ a mile of them.

Tides.—The corrected establishment of the port is 4h. 50m. The mean rise and fall of tides is 5·9 feet; of spring tides, 10·9 feet.

Stretching to the north-west from this bay is a large shallow marshy bay, fringed with trees and bushes. From its northern shore low land extends as far back as Fraser river. The western boundary of the bay is formed by the eastern shore of point Roberts. It is named Mud bay on the United States Coast Survey map.

Point Roberts.—When seen from the northern entrances of Haro and Rosario straits, this point stands out near the middle of the Gulf of Georgia as a bold wooded island. From Rosario strait the south-western point bears nearly N.W. by W. about 18 miles. From point Whitehorn it bears West distant 12 miles.

On the outer or gulf of Georgia side of point Roberts the shore runs about N.W. $\frac{1}{2}$ W. for 9 miles to the southern and principal mouth of Fraser river. To the mouth of the river at the outer edge of the Sturgeon bank the bearing is W. by N. and distance 9 $\frac{1}{2}$ miles. The south face runs E.N.E. 2 $\frac{1}{2}$ miles, and presents for nearly the entire distance a bold bluff about 150 feet high, and covered with wood. Half a mile off this shore anchorage may be had in from 10 to 15 fathoms, but in southerly weather it must be avoided. The eastern shore of the point runs nearly parallel with the western for 4 or 5 miles. Off the south-east point rocks and foul bottom stretch out S.E. for quite a mile. The geographical position of the south-western point, as determined by the United States Coast Survey, is lat. 48° 58' 15", long. 123° 4' 16". It is therefore nearly 2 miles south of the north-western boundary of the United States. Between this station and the bluff lies a marsh.

FRASER RIVER.—Fraser river,* in point of magnitude and present commercial importance, is second only to the Columbia on the north-west coast of America. In its entire freedom from risk of life and shipwreck, it possesses infinite advantages over any other river on the coast, and the cause of this immunity from the dangers and inconveniences to which all great rivers emptying themselves on an exposed coast are subject, is sufficiently obvious. A sheltered strait, scarcely 15 miles across, receives its waters; and the neighbouring island of Vancouver serves as a natural breakwater, preventing

* These remarks are from the *Vancouver island pilot*, edition 1864. In 1866 a light-vessel was moored at the entrance to the river, in about 10 fathoms. The light, fixed, can be seen from a distance of 10 miles. A bell is sounded in foggy weather. From it, Garry point bears N. by E. $\frac{1}{2}$ E. easterly, distant 5 $\frac{1}{2}$ miles; North Sand head buoy, N.N.W. $\frac{1}{2}$ W. 7 cables; and the South Sand head buoy, E.N.E. 2 cables.

the possibility of any sea arising which would prove dangerous to vessels even of the smallest class, unless they ground.

To the same cause may be attributed in a great measure the fixed and unvarying character of the shoals through which this magnificent stream pursues its undeviating course into the strait of Georgia; and there can be little doubt that it is destined, at no distant period, to fulfil to the utmost, as it is already partially fulfilling, the purposes for which nature ordained it—the outlet for the products of a great country, whose riches in mineral and agricultural wealth are daily being more fully discovered and developed.

The river, with its numerous tributaries, has its rise in the Rocky mountains, between 400 and 500 miles from the coast in a northerly direction, whence it forces its way in torrents and rapids, through one of the many great parallel valleys which intersect this region, confined by gigantic mountains, with large tracts of country, rich in agricultural resources on either side of them, until it reaches the town of Hope, which is about 80 miles by the windings of the river, in an easterly direction from its entrance.

Above the city of Lytton, which stands at the fork or confluence of the Fraser and Thompson rivers, 55 miles above Hope, many rich deltas occur, or as they are termed by the miners, bars, and among these known as the wet diggings, gold was first discovered in British Columbia.

At Hope the river assumes the character of a navigable stream; steamers of light draught reach this point and even the town of Yale, 15 miles above it, during from 6 to 9 months of the year. In June, July, and August, the melting of the snow causes so rapid a downward stream that vessels even of high steam power are rarely able to stem it, and during these months numbers of large trees are brought down from the flooded banks, which offer another serious obstruction to navigation. Between Hope and Langley the latter 90 miles from the river's mouth, there is always a considerable strength of current, from 4 to 7 knots, at times more; but at Langley the river becomes a broad, deep, and placid stream, and except during the three summer months the influence of the flood stream is generally felt, and vessels of any draught may conveniently anchor. The depth is 10 fathoms; the current not above 3 knots.

Midway between Langley and Hope the Harrison river falls into the Fraser and by it and a long chain of lakes extending in a general N.W. direction, a comparatively easy route has been established, by which the upper Fraser is reached at a point just below the Bridge river, in the heart of the gold region, thus avoiding that difficult and at present almost impassable part of the country between the town of Yale and the Mountains, by the main river a distance of about 90 miles.

Vessels of 18 feet draught may enter the Fraser river near high water, and proceed as high as Langley with ease, provided they have or are assisted by steam power. The only difficulty is between the Sand heads and Garry point, the entrance proper of the river, but while there are competent pilots and the buoys remain in their positions, this difficulty disappears. It must be remembered, however, that the tides of the strait of Georgia sweep across the channel of the entrance, and a large ship is recommended to enter or leave with the last quarter of the flood.

The great quantity of deposit brought down by the freshets of summer has created an extensive series of banks, which extend 5 miles outside the entrance proper of the river. The main stream has forced an almost straight though

somewhat narrow channel through these banks, and at its junction with the current of the strait of Georgia, which runs at right angles to it, has caused the wall-edged bank before alluded to, extending to Roberts point on the south, and Gray point on the north.

The river is at its lowest stage during the months of January, February, and March. In April it commences to rise from the melting of the snows, and is perhaps 2 feet above its lowest level; the flood stream is strong enough to swing a ship at New Westminster up to the end of this month. In May the water rises rapidly, the river is at its highest about the end of June, and remains up with trifling fluctuations until the end of July or middle of August. During these six weeks the banks are overflowed, and extensive plains above Langley covered for a space of several miles; the strength of the stream between Langley and Hope being from 4 to 7 knots, and in the narrow parts even more. The usual rise of the river at Langley due to these floods is about 14 feet, but from the testimony of an officer of the Hudson's Bay Company, who has resided more than 30 years there, it has been known to reach 25 feet.

From the middle to the end of August the waters begin to subside, and in September the stream is not inconveniently strong. September, October, and November are favourable months for the river navigation, as the water is then sufficiently high to reach Hope, and the strength of the current considerably abated. The shallow stern-wheel steamers have got to Hope as late as December; between this month and April, owing to the shoalness of the water and the great quantity of ice formed, navigation even by these vessels (only drawing 18 inches) is attended with great difficulty, and rarely practicable at all. The snags or drift trees which become imbedded in the river, also form a serious obstacle to navigation at this season.

In April the steamers commence again to run; in June, July, and August the rapidity of the current is the great obstacle, but these high-pressure vessels (commanding a speed of 11 and 12 knots) frequently accomplish the voyage, though at much risk.

The Harrison river route (page 272) obviates some, but not all these difficulties. At New Westminster the freshets raise the level of the river about 6 feet, but the banks being high no inconvenience is felt, and the strength of the stream is rarely 5 knots, during the winter from 2 to 3; for some miles within the entrance the low banks are partially flooded for a month or six weeks. The rise and fall due to tidal causes is from 8 to 10 feet at springs, between the Sand heads and the entrance of the river proper at Garry point; at New Westminster it is 6 feet, and at Langley scarcely perceptible.

Directions.—There are no natural marks sufficiently well defined, or which are not too distant, or too liable to be obscured in cloudy weather, to enable a vessel by their help alone to hit the narrow entrance between the Sand heads with accuracy. A large spar buoy is placed on the south Sand head, and the northern edge of the channel within is marked by similar buoys, somewhat smaller, for the colour of which see chart; the Sand head buoy can be seen well at a distance of 2 miles.

To make the entrance of the river approximately, the following bearings will be found useful. From the eastern entrance of Active pass, which is now the usual route for steamers from Vancouver island, the entrance bears N. by W. $\frac{1}{2}$ W., 11 miles; from the entrance of Portier pass, which shows as a very distinct gap between Galiano and Valdes islands, the entrance between the Sand heads bears N.E. $\frac{1}{4}$ E. distant $11\frac{1}{2}$ miles; and when that gap bears

S.W. $\frac{1}{2}$ W., and the extreme of the trees on Roberts point spit E. $\frac{1}{2}$ S. a vessel will be within 1 mile of the entrance, and should have from 45 to 50 fathoms water.

Mount Provost, a remarkable sharp peak on Vancouver island, kept on a bearing S.S.W. $\frac{1}{2}$ W., will also lead for the Sand heads. In coming from the northward, Passage island, at the entrance of Howe sound, kept on or just open of a remarkable peak on Anvil island within the sound, bearing N. by W. $\frac{1}{2}$ W., will clear the edge of the Sturgeon bank until the bearings just given are brought on for entering.

When at the entrance, a remarkable solitary bushy tree will be seen on Garry point, the northern entrance point of the river proper, straight for which is the general direction of the channel; it bears from between the Sand heads N.N.E. a little easterly, and is just 5 miles distant. Although to steer direct for this tree would not clear the outer edges of either bank for the whole length of the channel, yet it will be found an excellent guide, not only to make the entrance, but to give almost the straight line in, should the buoys be removed.

The south Sand head dries before low water, and has frequently a ripple on it when covered; when the buoy which is moored off it is seen, it should be brought to bear N.N.E. and then steer to leave it a cable's length on the star-board side, which will lead nearly in mid-channel, the buoys then on the port or north side of the channel should be kept from $\frac{1}{2}$ a cable to a cable on the port hand. The least depth in the channel is 11 or 12 feet at low water, and this occurs about midway between the Sand heads and Garry point; at or near high water from 18 to 20 feet, and sometimes 22 feet, may be carried in to within $1\frac{1}{2}$ miles of Garry point, when it deepens to 4 and 5 fathoms; the point should be passed close.

There is always a great quantity of drift wood on the point, and the northern side of the river should be kept aboard for nearly 2 miles, where from 8 to 10 fathoms will be found; it is then necessary to cross to the south side, and to keep close along it, passing the mouth of the South or boat channel, nearly 2 miles above which, and abreast a clump of high trees, cross again to the north bank to the left of two low sandy islands; the channel then leads rather along the north side of the river, and with the assistance of the chart will be found sufficiently easy for vessels of 20 feet draught until 6 or 7 miles above Langley.

It is not, however, recommended for a stranger to enter without a pilot, and certainly not under any circumstances unless the buoys are in their places between the entrance shoals; any further detailed directions would be practically useless; a pilot, the chart or local knowledge, are absolutely necessary.

New Westminster, the capital of British Columbia, stands on the north or right bank of the Fraser river, just above the junction of the North Fork, and 15 miles in a general north-easterly direction from the entrance proper. It occupies a commanding and well chosen position, being within an easy distance of the entrance, and having great facilities for wharfage along its water frontage, a good depth of water, and excellent anchorage.

The river bank is somewhat precipitous in places, and the country at the back is like all the lower parts of the Fraser (unless, indeed, in the immediate neighbourhood of the entrance, where it is swampy grass land, subject to inundation during the freshets of summer), densely wooded; a considerable clearing, however, of the timber has taken place in the vicinity of the town,

which already assumes a prominent and thriving aspect, and when the facilities for entering the river and its capabilities are better known, will no doubt rise more rapidly into importance.

The military establishment or camp of the Royal Engineers, a mile above New Westminster, is a most picturesque spot, commanding an uninterrupted view of the Queens reach, a broad, deep, and magnificent sheet of water. From the camp to port Moody, an excellent harbour at the head of Burrard inlet is 4 miles in a north direction; a good trail exists between the two places, and a waggon road is in course of construction to the outer harbour of the inlet, which, when completed, will be an important work. At 5 miles eastward of New Westminster is the entrance to the Pitt river, which runs in a general direction from N.N.E. to N.E. for 28 miles, terminating in two remarkable lakes enclosed between almost perpendicular mountains, and navigable to the head for vessels of 14 feet draught, the depth in places being far too great for anchorage. A large tract of low grass land lies on both sides of the entrance of the Pitt, which, however, is generally overflowed, or partially so, during six weeks of summer.

Derby or New Langley is 12 miles above New Westminster in an easterly direction, on the south or opposite side of the river; the channel between is deep, and there are no impediments to navigation. This spot was first selected as the capital, and as a town site it is unobjectionable, having a considerable tract of good cleared land in its neighbourhood, and all the requirements of a commercial port; the depth of water here is 10 fathoms. Large vessels may proceed with ease 7 miles beyond Langley, the navigation then becomes somewhat intricate, and the current too rapid for any vessels but steamers of light draught and great power.

North Fork.—This is another entrance to the Fraser, navigable for vessels drawing 6 or 8 feet water, and is generally used by the natives proceeding to or from Burrard inlet. Its junction with the main stream occurs immediately below New Westminster, whence it runs in a westerly direction, and enters the strait of Georgia through the Sturgeon bank, about 5 miles northward of the Sand heads; a large low partially wooded island lies in its entrance, and splits the channel into two arms.

In many parts of the North Fork the water is deep, in holes, and the bottom irregular; it can only be considered a boat channel.

SOUTH-WEST COAST OF VANCOUVER ISLAND.

GENERAL REMARKS.*—Vancouver island, first made known to us by Captain Cook, is situated between latitudes $48^{\circ} 20'$ and 51° , longitudes 123° and 128° . It is separated on the south from Washington territory by the strait of Juan de Fuca, and on the east from British Columbia by the gulf of Georgia, and by Johnstone strait. Essentially a mountain ridge,

* These interesting remarks upon Vancouver island are chiefly extracted from the *Journal of the Royal Geographical Society* 1864. See also an article on the same subject in the *Mercantile Marine Magazine* 1867.

its buttress-like walls descend for the most part abruptly to the shore, fringed, however, in many places, more especially on its south-eastern and eastern sides, by the undulating country, thickly wooded in general, but here and there containing patches of open grass-land.

The island is of an elongated oblong form, nearly 300 miles in length, by 80 to 50 in average breadth, attaining, at mount Victoria in lat. $50^{\circ} 8\frac{1}{2}'$, long. $126^{\circ} 9'$, an elevation of 7484 feet. Its outline is boldly picturesque; its shores are characterised by abrupt cliffs, rocky promontories, sheltered coves, pebbly beaches, and fine harbours.

The whole western side presents a gloomy, frowning aspect. Numerous arms of the sea, fiord-like in character, penetrate between the walls of metamorphic and trappean rock, which, on either hand, rising into lofty peaks and ranging into broken sierras, or sloping from rounded dome-shaped masses, form the buttresses of the land, opposing and resisting the fury of an ocean, for the greater part of the year anything but pacific. Along the eastern side a more open and more undulating country marks the existence of underlying sedimentary rocks, which, in the form of carboniferous sand-stones and lime-stones, at intervals fringe the coast.

The whole country is more or less densely wooded, excepting just where the summit of a mountain affords no hold for plants, or where, as in the neighbourhood of Sooke, Victoria, Cowitchin, and Comuz, limited ranges of open grass-lands occur.

In the winter the tone of colouring of the landscape is sombre, the weathered rock-surfaces mingling their purple hues with the dark green foliage of the pine. But in the summer and autumn these heavy tones are lightened by the bright colours of numerous flowering plants; by the yellow-green light that trembles in the swampy hollows from the poplar, the alder, and the aspen; and, later in the season, by the rich orange and crimson tints of the maple. The surface is beautifully diversified by mountain precipice, hill and dale, wide-spreading lakes, and solitary tarns, cut up by numerous arms and inlets of the sea; in no case does the water-shed suffice to give a navigable stream. There are no rivers, in the stricter sense of the word, such streams as flow through the country being simply the short watercourses, which discharge the overflow of lakes or the surface-waters of the neighbouring ridges—torrents in winter, nearly dry in summer, valuable only as a power for driving grist and saw-mills, and possibly at a future day to be rendered useful as a means of irrigation—a process by which many parts of the country would be much benefited.

As might be expected in a country having a clay subsoil and covered with material through which water readily percolates, springs are numerous and the water excellent. Where the clay, however, forms the surface-soil, some inconvenience is experienced, as in the neighbourhood of the town of Victoria.

The remarkably low temperature which characterises, all the year round, the ocean that washes the shores of this island, has a considerable influence on the climate; this ocean is boreal in character, its temperature being kept low by Arctic currents which sweep down the coast, even to below the latitude of San Francisco, and by the quantity of melting snow discharged by numerous rivers and mountain torrents on the British Columbian coast.

Climate.—The climate of Vancouver, in the succession of its seasons and general thermal conditions, approximates closely to that of Great Britain, modified by special circumstances connected with its physical geography. Situated

close to a continent the mountain ranges of which are clothed or capped with perpetual snow, and surrounded by an ocean remarkable for its extremely low temperature, certain peculiarities present themselves to the notice of the climatologist; and these are well and specially marked in the south-east end of the island, owing to its proximity to the Olympian range of mountains in Washington territory. This range, running east and west, presents its northern aspect to Vancouver island; and since, on this aspect, the snow remains on the mountain peaks all the year round, the winds which blow from this direction are necessarily cold and chilling. Other winds, blowing over the cold sea water, also have this chilly feeling, and give this peculiarity to the climate, as far on in the year as the 21st of June, of a fine clear atmosphere with a bright sun and cold winds, like a late spring in England.

The seasons in general take the following course:—After the gales with rain, which generally mark the period of the equinox, fine clear weather sets in, and continues till about the middle of November. At this period rain begins to fall continuously for days, and gales of wind are frequent on the coast.

The barometer ranges from 29·50 to 30·10, and falls rapidly on the approach of a southerly gale. Rising gradually to 30·20 and 30·50, a northerly wind springs up, and 3 days of fine clear weather, with hoar-frost generally follow. After the third day, the barometer slowly falls, and again the gale springs up, and the rains come down, to be succeeded, after a few days, by a rising glass and frosty weather, which, as the season advances, occasionally becomes intense, and is accompanied by hail and snow. The latter seldom lies for any length of time; the winters of 1852-53, 59-60, and 61-62, the last especially, being remarkably severe exceptions. These exceptional seasons occur in all climates, and here prove the rule that an open, wet winter characterises Vancouver island.

There is a great amount of rain, but it is to be regretted that there is no register to show what the rainfall actually is.

The great quantity of uncleared and undrained land tends to make the spring later and colder than in England. The summer is drier, with a more scorching sun. Little or no rain falls from the middle of April till the Equinox, or the end of October. The prevailing winds during these summer months are from south-west to north-west, blowing freshly during the day, the nights tranquil and clear. Northerly winds occasionally prevail, and, blowing over the heated land, are, in the southern parts of the island, hot and dry.

The autumn of the American climate is finer than that of the European, and the fine weather (the Indian summer) extends further into the year. The winter months in ordinary seasons are much the same as in the west of England; in the severer and exceptional, more like the Midland Counties and east coast of Scotland. There are thus, as it were, two seasons, a wet and a dry. The rainfall, it may be noted, is greatest at night. On the whole, the climate of Vancouver may be fairly described as very fine, healthy, and enjoyable.

In ordinary seasons the Isothermal line (line of equal temperature) of Vancouver island would pass through the southern counties of England. Taking the average annual maximum temperature at London in June as 86°, the minimum as 22° Fahr. in January, the range will be 64°. In Vancouver, the maximum temperature for the year is 84° in June, the minimum 14½°, which gives a range of 69½° Fahr. But this fall to 14½° for a day or two in December must be looked on as exceptional, and the usual minimum standard

of 22° Fahr. accepted; this gives a range of 62° Fahr., almost the same as that of London.

The register kept on shore has been taken in preference to one kept on board, in making the above comparison, the conditions being more equal; for it must be borne in mind that, strictly speaking, there are two well-marked climates in Vancouver, viz., a littoral and an inland climate: the former, due to the causes already mentioned, cold arctic currents, &c. &c., has a lower range, as shown by registers kept on board ship.

The whole area of Vancouver island comprises about 12,000,000 acres, the greater proportion of which is mountain and barren rock.

Following the districts as herein set down, it will be interesting briefly to set forth their special characteristics and capabilities.

Of the surveyed districts, beginning at the south-eastern extremity of the island, *Sooke* first claims our attention, and it will be found to possess some feature of considerable importance. Situated advantageously and conveniently on the strait of Juan de Fuca, but for difficulties connected with the approach from seaward to its magnificent inner harbour, this district must have long ago assumed a position commercially of high importance. There is reason to believe that these difficulties may in time be overcome, and by the aid of steam-tugs vessels may be safely anchored in a harbour safe and land-locked.

A carboniferous deposit in this district has been proved by "bore" to the depth of 84 feet, and two thin seams of coal have been passed through. A promising vein of copper has been found, and is now being worked.

Esquimalt district contains 12,426 acres. The soil, generally, is poor in quality, covered with scrubby timber, a great deal of rock, and many lakes and large swamps. The great importance of this district consists in its excellent harbour, described on p. 287.

The village or hamlet of *Esquimalt* consists of a few scattered houses, chiefly hotels, dependent for support on the mail-steamers and ships of the royal navy there stationed.

The districts of *North* and *South Saanich* contain respectively 10,587 and 12,216 acres. These districts contain some of the best agricultural land in Vancouver. There are indications of copper, and a coal-seam of inferior quality crops out on the eastern coast.

The district of *Nanaimo* has a very important geographical position, and possesses a very interesting, and economically valuable, geological history.

The working of the valuable coal-field of *Nanaimo* has been carried on very irregularly; and only of late have any steps been taken on a scale commensurate with its importance. The value of the new seam now being worked has been fully recognised, and the demand increases rapidly.

Rising behind the settlement of *Nanaimo*, is mount Benson, a trappean mass, which, attaining the height of 8866 feet, sends, in a curvilinear form, spurs running north-east and south-west, describing the segment of a circle. Resting on these spurs, dipping south-east and easterly, are the upturned edges of the sedimentary rocks, the whole much disturbed, not only by numerous faults, but by twistings laterally, heaves and slips of strata.

On Chase River, which flows along the south-eastern spur, there are three outcrops of coal, 8 ft. 10 in., 5 ft., and 2 ft. 6 in. respectively. The first or Douglas seam, now being worked, furnishes the best coal as yet taken out, and is reported as most favourable, both by analytic chemists

and practical men.* The present working is in a proved area of 600,000 square yards. A shaft, 60 fathoms deep, reaches the coal, which yields 1 ton to the square yard, increasing in the dip, so that, at a fair computation, 800,000 to 1,000,000 tons of coal may be calculated on from this seam alone. If the other underlying 5 feet and 2 feet 6 inches seams can be conveniently reached and worked, it may be fairly assumed that in this one block 3,000,000 tons of coal are available.

Nanaimo settlement is prettily situated. The site of a town is now being laid out which will probably soon be a port of entry; the soil, a sandy loam, is dry and healthy, being suitable for gardens and orchards.

The *Valley of the Comux*, another fine agricultural district, as yet unsurveyed, lies north of Nanaimo. Its special characteristic is the existence of successive terraces of open prairie-like land, marking separate periods of slow upheaval. But, partially explored, no further special account of its capabilities can be given than that, in its general character, it closely resembles the Cowichin valley.

Proceeding north and west, passing Valdes island, and through Johnstone strait, an excellent route for steamers, abounding in good anchorages, the extreme north-west point of the island is reached, where fort Rupert, a trading station of the Hudson Bay Company, is established. Here the carboniferous formation is again met with but there have been fewer disturbances than at Nanaimo; the strata lie almost horizontally. The land is unsurveyed.

The western coast of the island, commencing at cape Scott, possesses a great number of remarkable and interesting features. From this cape a group of islands extends westerly for 26 miles. Between the cape and the nearest islands there is a good clear passage 10 to 30 fathoms deep.

Immediately south of cape Scott is Quatsino sound, an important inlet, stretching across the island nearly to fort Rupert, on the eastern side. Coal has been found here, which with other resources, copper and fine timber, and so forth, will make this a place of importance.

Cape Cook separates Quatsino from Kynuquot, a district which extends to Nootka sound. This latter is a deep inlet, possessing few harbours or good anchorages. The small harbour or cove at its entrance is famous as the scene of the Spanish occupation dispute, and an anchorage nearly opposite has a special interest as having been Cook's first.

Clayoquot sound differs from all the other inlets of this coast, its entrance being full of banks and shoals of sand and gravel, instead of a deep muddy bottom. Here, also, is the gneisso-granitic axis of elevation already alluded to, having associated therewith micaceous, hornblendic, and coarse-framed quartzose rocks, intruded trappean dykes, and quartz veins, indicating a region most probably rich in mineral wealth.

Barclay sound, situated close to the entrance of the strait of Juan de Fuca,

* The excellent quality of this coal is now indisputable. It yields a hard, lustrous, fissured, and little swollen coke. It contains little hygroscopic moisture, and burns well, with a steady heat and a brilliant flame—spec. grav. 1.317. Its steaming properties have been very favorably reported on by the engineers of H.M. ships and other vessels on the coast. In stowage, Welsh coal has the advantage over it of about 12 per cent.; Newcastle (English) 2 per cent.; but with most north country coal, and all Scotch, the advantage would be in favour of the Nanaimo coal (Douglas seam) by 2 per cent.

has a very important geographical position. It is a somewhat open sound, studded with numerous islands, it possesses several good anchorages, one within very convenient distance of Cape Beale, on which a lighthouse will in all probability be ultimately erected. At the upper end of the sound a very remarkable cleft in the mountain-range, known as the Alberni canal, leads to a level country of considerable extent, heavily timbered, with the finest specimens of pine and other woods perhaps anywhere to be seen. Through this flows a stream, discharging the waters of a chain of lakes, which penetrates northerly into the interior. The anchorage is good, and the whole sound, canal, and harbour, can nowhere be excelled in the facilities they afford for the protection and defence of commerce.

Such is the general character of Barclay sound. Its political and commercial importance merit a more special detail. The Alberni canal is entered through the Devil's gap, the rocky sides of which run so sheer down into the deep water that the largest ship could make fast alongside to the pine-trees, the shores, on either hand, not being more than a pistol-shot apart. The fleets of the Pacific might ride in the sound, or, for the matter of room, inside the Devil's gap. A more secure place for an arsenal than Alberni canal, if the Devil's gap had one or two heavy guns mounted, could not be found on the Pacific coast. Its convenience also for refitting ships is great; timber for masting or repairing purposes being plentiful. Plenty of fair farming land, and fresh water in abundance. Possibly, the fact that the money of the colony is chiefly invested at Victoria, decides the question at present in favour of Esquimalt as the head quarters of the Royal Navy; but in case of a war in the Pacific, there can be little doubt but that Alberni canal and Barclay sound, from the commanding position of the latter, at the mouth of the strait of Juan de Fuca, will be found an invaluable base of operations for our navy in that part of the world.

The high and rocky sides of the Alberni canal end on the right hand with a bold outstanding rock, known from its colour as Copper mountain; and from it the canal opens into a wide oval shaped basin, at the far end of which the buildings of the Alberni settlement are seen. The river Somass runs into this oval-shaped basin, and at the junction there are considerable flats of good meadow-land.

Several good sized schooners have been built at Alberni, and others are now building. Fish curing has been carried on to some extent; the abundance of salmon and cod in the neighbourhood making this a favourable place for such operations. A coasting trade is carried on with the Indians for furs, oil, fish, and so forth.

Of San Juan it may be sufficient to say that its importance as a military post has been much exaggerated. Its position has been supposed to be such as to confer on that military power which should occupy it, the command of both the Fraser river and of Victoria harbour. But this is a fallacy; it commands neither; more especially since the almost exclusive introduction of steam vessels and the discovery of the Rosario channel.

A great portion of the area of Vancouver island, which is neither sold, emptied, nor reserved (7,598,215 acres) is unavailable land, perhaps four-fifths of the whole being barren rock. Heavy and very valuable timber now covers many fine districts, which, as they become cleared, will become available for cultivation. The expense of clearing is at present great, from £8 to £14 per acre. The richer alluvial soils, bearing willow, poplar, and alder, are cheaply and readily cleared by fire. In the agricultural districts described, there is,

however, enough for farming purposes on a small scale, into which the farmer can at once put his plough; the clearing of the timber from the land keeping pace with the wants of a farm, for outbuildings, and other purposes.

Farming operations are conducted on the same rotation four-course system as in England. The crops generally raised are wheat, barley, oats, and peas. The green crops are, turnips, mangel-wurzel, vetches, potatoes, and all kinds of vegetables. Nowhere does the potato flourish more or attain a better flavour.

In her soils, Vancouver island possesses all the qualifications necessary for raising food for man and beast; and these soils are by no means so limited in extent or inferior in quality, as to preclude the possibility of the island being a grain producing colony. The mineral resources of Vancouver may be summed up as coal, copper, and possibly silver and gold. The latter is widely spread over the country in the drift clays and gravels; and of late, auriferous quartz has been found in the neighbourhood of Victoria, leading to a great pre-emption and occupation of land.

The following will give some idea of the resources of Vancouver island in woods of economic value. The list is according to popular names. White fir, spruce fir, balsam fir, white pine, yellow pine, cedar, vine-leaved maple, broad-leaved maple, alder, willow, poplar, yew, logwood, cotton-wood, crab-apple, service-tree, hemlock, oak, arbutus, yellow cypress, &c. Of all these, the white fir or Douglas pine (*Abies Douglasii*), is the most important; it grows to an enormous size, and is one of the best woods for spars known. This is the tree of the colony, and it is the commonest on the north-west coast. In some instances this tree has been known to square 45 inches for 90 feet. The cedars are very fine, with an average diameter of 6 to 7 feet. One has been measured of 14 feet. They are found in great abundance both at Sooke and Nanaimo.

The fisheries will one day prove a source of great wealth to the colony. Extensive banks lie off the south-western extremity of the island, and also in Puget sound and in the gulf or strait of Georgia, off Burrard inlet. All of them are well stocked with fish, especially cod, the true *gadus*, an excellent fish of its family, small but very good. In the neighbouring streams and lakes, and surrounding seas, are salmon (five species), trout (many species), herring, haddock, smelt, halibut, sturgeon, whiting, several species of rock fish, and sea perch, eulachon, &c.,

Making the island from seaward.—When approaching Vancouver island directly from seaward, the mountains will necessarily be the first part of it that will come into view in clear weather, when they will appear as an unbroken range; on a nearer approach it appears thickly wooded, and apparently fertile, intersected with many deep openings and valleys, which in most cases are some of the inlets already alluded to. The coast is generally low and rocky, but rises immediately to mountains of considerable height. It is fringed by numerous rocks and hidden dangers, especially near the entrances of the sounds, and to avoid these the exercise of great caution and vigilance is requisite; therefore, on no account (except necessity) should a stranger attempt to enter any of the harbours or anchorages during night or thick weather. When about to make the coast, it cannot be too strongly impressed on the mariner to take every opportunity of ascertaining his vessel's position by astronomical

observations, as fogs and thick weather come on very suddenly at all times of the year, more especially during the summer and autumn months.

Tidal Current.—The flood stream appears to set along the coast north-westward, and the ebb south-eastward; neither are of great strength, except in the vicinity of Juan de Fuca strait and Scott islands. During the summer months a set is generally found to the southward, and in winter in the opposite direction, but as a rule the currents are irregular, and apparently influenced by prevailing winds.

Soundings.—At the entrance of Juan de Fuca strait the 100-fathom edge of the bank extends upwards of 80 miles from the shore; it then runs nearly straight in a N.W. by W. direction, gradually nearing the coast, until abreast cape Cook the depth of 100 fathoms is within 4 miles of the shore; north-westward of cape Cook the 100-fathom edge does not extend more than 10 miles off shore, and southward and westward of Scott islands even less.

The nature of the bottom, when under 100 fathoms, appears to be generally of sand and gravel, and does not differ enough in one part from another to afford any guide for ascertaining a vessel's exact position on the coast; the bank, however, extends sufficiently far from the shore south-eastward of cape Cook to give a seaman due notice in thick weather of an approach to the land, as the edge of 100 fathoms does not come within 18 miles of it, and the bank shoals very gradually.

The Coast.—The south coast of Vancouver island having been fully described in the section on Juan de Fuca strait, it remains for us to add a few remarks upon the harbours on the south-west side of the island. For a complete description of these harbours and the coast, also for the channels separating the island from the main land, we must refer our readers to the *Vancouver Island Pilot* and the charts published by the Admiralty*.

From Bonilla point to cape Beale, the eastern point of entrance to Barclay sound, the coast trends almost due West 23 miles. At about 6 miles from the point is the entrance to Nitinat lake, a narrow and shallow channel having a depth of less than 12 feet in it and across which the sea usually breaks with great violence in bad weather. The lake is of considerable size, extending to the northward. The hills immediately northward of it are estimated to be 2000 feet high. At 2 miles southward from the lake the depth is 27 fathoms.

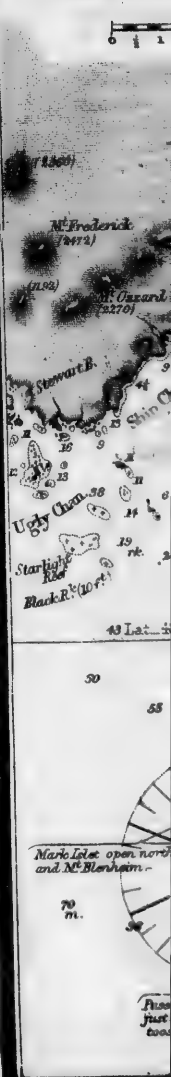
A remarkable waterfall, named Tsusiat, situated on the coast—in lat. $48^{\circ} 41'$, long. $124^{\circ} 58'$, is an important landmark to vessels approaching Juan de Fuca strait from southward. It can be recognised from a considerable distance.

In long. $125^{\circ} 8'$ is a bay named Pachena, having in front of it a small islet, only 10 feet high, known as Sea-bird islet. The bay extends 2 miles in a northerly direction, is nearly $\frac{1}{2}$ of a mile wide, and has a depth of 6 fathoms at the entrance shoaling gradually to 8 feet at its head. It is safe only with winds from the land, for southerly and south-west winds send in a heavy swell, consequently vessels very seldom enter it. At its head is a stream which will admit boats.

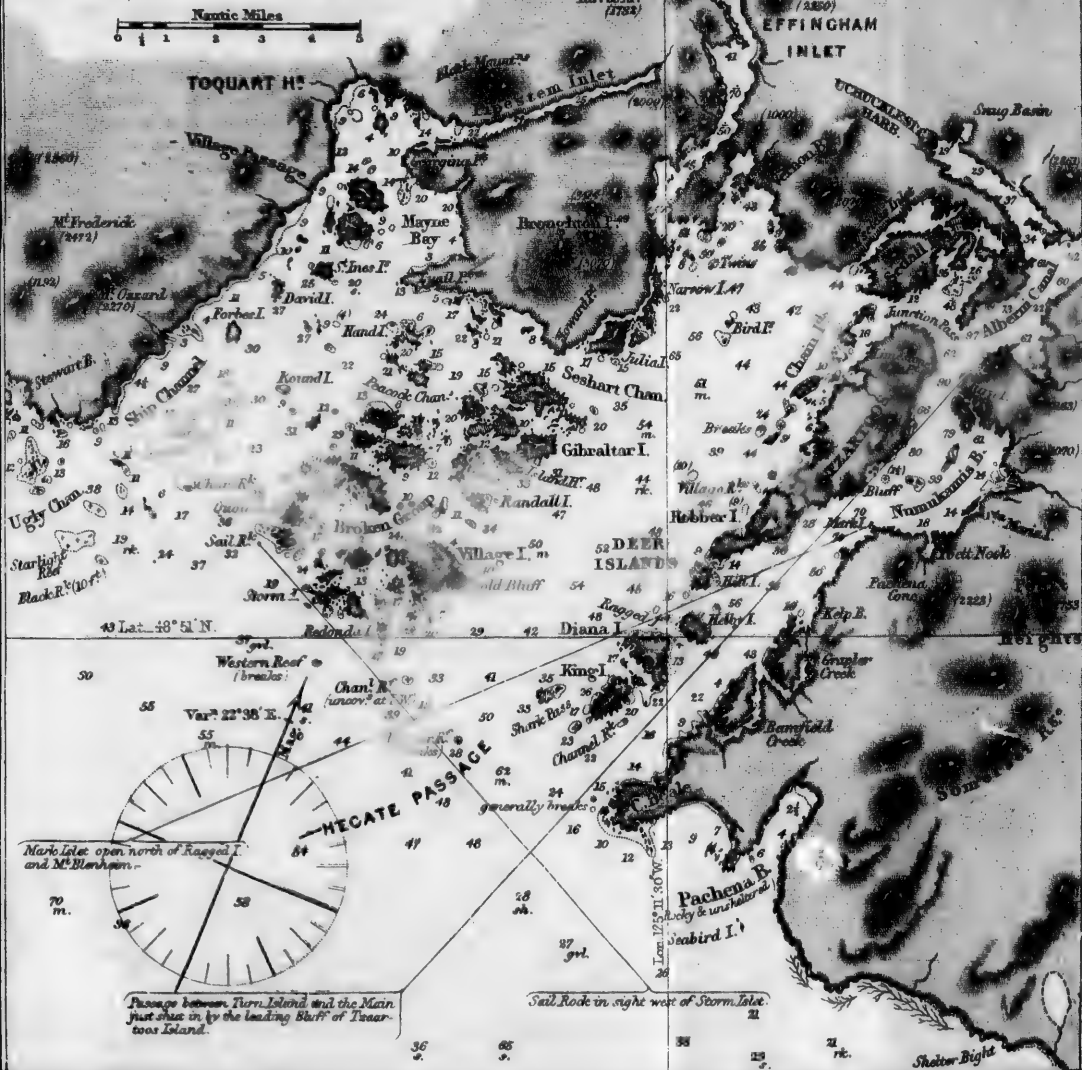
BARCLAY SOUND.—In this extensive inlet are many places where a vessel may lie at anchor and be completely protected from the prevailing wind.

* See the Note * at foot of page 269.

BARCLAY



BARCLAY SOUND



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Scattered about it are islets of various sizes, which are separated generally by passages of depth sufficient for ordinary vessels. The sound is 14 miles wide at the entrance and maintains this breadth for nearly 12 miles inland, when it separates into several narrow inlets or canals, the most extensive and deepest of which, the Alberni canal, extends 23 miles in a northerly direction, its head reaching within 14 miles of the eastern or inner coast of Vancouver island. The depth in front of the settlement at the head of this inlet is 6 to 4 fathoms. The mountains immediately on each side of the inlet are very lofty, some of their summits reaching an altitude of 3000 feet.

The navigation of Barclay sound is too intricate to be attempted by strangers, unless in the exercise of very great caution. It is recommended to have the Admiralty charts Nos. 584 and 592 at hand for reference. It should be observed that generally speaking the shores are low, except in the northern part and among the canals where they become high, rugged and mountainous.

Reefs.—The reefs in the entrance to Barclay sound, those most to seaward, and which may consequently be encountered by vessels sailing along the coast and not intending to enter the sound, are named Danger, Channel, Western, Black rock, Starlight and Humphries. In addition to these a reef extends out from cape Beale, the east point of entrance, about $\frac{3}{4}$ of a mile in a south-easterly direction.

Danger Reef.—This isolated reef is in the south-east part of the entrance to Middle channel, the wide channel leading into Barclay sound between Deer islands on the east and Village island on the west. It is $8\frac{1}{2}$ miles from cape Beale in a W. $\frac{1}{4}$ N. direction, and from it Ship islet (95 feet high), the southernmost of the Deer islands, bears N.E. by E. $\frac{1}{4}$ E. distant $2\frac{1}{2}$ miles. Its extent is but small, and the sea breaks upon it in heavy weather. The position of this reef makes it a very dangerous one; the sea around it is also very deep, there being soundings of 20 to 40 fathoms almost close to it. The marks that have been given for clearing it at the distance of about $\frac{1}{2}$ a mile, are; on the east side, Swiss Boy island just open west of Entrance island, bearing N.N.E.; on the west side, Mark islet open northward of Ragged island, bearing N.E. (mount Blenheim, 2408 feet high, is on the same line of bearing); and on the south side, Sail rock (100 feet high) in sight westward of Storm island, N.W. by W. $\frac{1}{4}$ W.,—this mark also leads south of Channel reef, the reef mentioned next.

Channel Reef.—This reef lies nearly in the centre of the entrance to Middle channel, its position bring $8\frac{1}{2}$ miles W. $\frac{3}{4}$ S. from Ship islet, and $1\frac{1}{2}$ miles W.N.W. from Danger reef. It is about a cable in extent, uncovers at low water, and close to its eastern side is a depth of 27 fathoms. In the channel between it and Danger rock is a depth of 19 to 50 fathoms. The mark given for clearing Danger rock on the west side clears this reef on the east side.

Western Reef.—This reef lies in the south-west part of the entrance to Middle channel, its position being $5\frac{1}{2}$ miles W. $\frac{3}{4}$ S. from Ship islet, and 1 mile south of the islands composing Broken group. It is about a cable in extent, awash at low water, and should not be approached within $\frac{1}{2}$ a mile.

Black Rock.—This rock is at the south-west side of the entrance to Western channel, the wide channel into Barclay sound westward of the cluster of islands known as Broken group. It is 10 feet above high water, of but small extent, and some sunken rocks extend from it 2 cable's length in an easterly direction. From it Sail rock bears N.E. by E. $\frac{1}{4}$ E., distant $8\frac{1}{2}$ miles.

Starlight Reef.—This is a cluster of rocks above and under water about $\frac{1}{2}$ a mile westward of Black rock, its centre being in lat. $48^{\circ} 58'$, long. $125^{\circ} 30\frac{1}{2}'$. It is about $\frac{1}{2}$ of a mile in extent, and upon it the sea breaks heavily in bad weather.

Humphries Reef.—This is a cluster of rocks 2 cables in extent, situated about $\frac{1}{2}$ of a mile southward of Lookout island, an island 150 feet high on the west side of the entrance to Ugly channel, the westernmost of the channels into Barclay sound.

In a southerly and westerly direction from Barclay sound, is a bank of sand and gravel which extends 20 to 25 miles from the land and has upon it soundings of 88 to 48 fathoms. In the middle of this bank is a deep hole, the east part of which is 5 miles south-westward from the entrance; thence the whole extends 19 miles in a W.S.W. direction, with depths varying from 60 to 100 fathoms. This bank and hole are a valuable means of ascertaining a vessel's position when approaching the sound from south-westward in thick weather, as by attention to soundings her position can be ascertained within a few miles. South-eastward of the entrance to the sound the water is deeper, there being at a distance of 10 miles from the shore a depth of 60 to 70 fathoms, on sand and mud.

It is high water in Barclay sound on the days of full and change at 12h. The rise and fall of the tide is about 12 feet.

The Coast.—From Barclay sound the coast trends W. by N. $\frac{1}{2}$ N., about $17\frac{1}{2}$ miles to point Cox, the east point of entrance to Clayoquot sound. The land in the vicinity of the sea may be considered as rather low, and when viewed from a distance, bears the appearance of being well wooded; the coast consists alternately of rocky cliffs and sandy beaches, and has many detached rocks lying at a little distance from it. The surface of this low country is very uneven, and at a short distance from the sea meets a compact body of rugged dreary mountains, whose summits are covered with snow during the greater part of the year, which, says Vancouver, extended on many, though not on all of them, a considerable way down, and impressed us with no great opinion of the fertility of the country.

The depth at about 4 miles off this shore is 20 to 27 fathoms, and it is recommended when coasting along to give it a berth of not less than $2\frac{1}{2}$ miles.

Point Cox is a rocky projection which may be easily recognised by a hill, named Vargas cone, 438 feet high; this rises just within it, and is a conspicuous object when viewed from westward. The point ought not to be approached nearer than $\frac{1}{2}$ a mile. Vargas cone is in lat. $49^{\circ} 5' 30''$, long. $125^{\circ} 52' 30''$.

When approaching Clayoquot sound from south-eastward, care is required to avoid the Gowlland reef, consisting chiefly of a cluster of bare rocks, from 10 to 15 feet above the surface at high tide, situated 2 miles from Vargas cone in a S.E. $\frac{1}{2}$ S. direction. It is $\frac{1}{2}$ of a mile from the coast, and should have a berth of at least a mile when passing. Between it and the land are rocks above and under water.

CLAYOQUOT SOUND is comprised between point Cox, just mentioned, and Sharp point, a low rocky projection forming the west side of entrance of Sydney islet, the most western part of the sound. Sharp point forms with the main land on its western side a narrow inlet, named Refuge cove, (subsequently described); its extremity is in lat. $49^{\circ} 20' 20''$, long. $126^{\circ} 15' 50''$. From Cox point to Sharp point the direct bearing and distance are W. by N. $\frac{1}{2}$ N., 21 miles.

Clayoquot sound is 80 miles long in a westerly direction, and 16 miles broad. It contains many large islands, one of which, named Flores, is of square form and 7 miles across. Its shores are broken into several inlets of considerable size and depth, the most eastern of which is known as Tofino inlet. Fronting the sound are many dangerous rocks which require due caution to avoid; at a mile outside these the depths vary from 20 to 80 fathoms.

The mountains in and about Clayoquot sound are very lofty, and visible many miles at sea; among them, the Cat-face mountains are conspicuous. The latter consist of a remarkable flat-top range, which rises on the main shore of Vancouver and fronts Ship channel, the only passage into the sound that ought to be attempted by strangers; on its south side are some patches of cliff and bare rock. The highest of the Cat-face mountains has an altitude of 3870 feet, and is in lat. $49^{\circ} 16' 20''$, long. $125^{\circ} 59'$. Mount Colnett, in Meares island, is 2616 feet high; and the most lofty mountain in Flores island has a height of 2810 feet.

As the navigation of Clayoquot sound is too intricate to be followed by strangers, it is useless to give a detailed description of its islands and channels; we therefore refer our readers for a fuller account of it to the *Vancouver Island Pilot* and the Admiralty chart No. 584, without having which no shipmaster should attempt to enter. There are several apparently deep channels into the sound, but they are all, with the exception of Ship channel, tortuous and filled with rocks; Ship channel is consequently the only safe passage in. The latter channel may be easily recognised in clear weather by its position with regard to the Cat-face mountains*, but if in doubt, there is generally, when in its vicinity, little difficulty in obtaining the services of a native of sufficient intelligence to pilot a vessel in. The inner waters of the sound should only be navigated by a steamer or a handy vessel of light draught of water, and the chart is the best guide. The following remarks on Ship channel are extracted from the *Vancouver Island Pilot* just alluded to.

"Ship Channel lies westward of Vargas island, between it and a number of small islands and rocks. Its entrance is nearly 11 miles westward of Cox point, and the channel is 5 miles long in a N.N.E. direction, with a breadth varying from $\frac{1}{2}$ to $1\frac{1}{2}$ miles. The soundings in the south part vary from 20 to 22 fathoms, decreasing to $5\frac{1}{2}$ fathoms in the shoalest part near the north end; the tide runs through it from 1 to 2 knots.

Bare Islet, at the south-east entrance point of the channel, is small, rising to a summit 40 feet high in the centre, and forms a good mark for identifying Ship channel; a rock which breaks lies 5 cables E. by S. from it, but there are 20 fathoms within $\frac{1}{2}$ a mile of its south-west side.

Plover Reefs, on the east side of the channel $\frac{1}{2}$ a mile north-westward of Bare island, are of considerable extent, stretching 1 mile from the west side of Blunden island, and some parts are 6 feet above high water; there are 5 fathoms at 2 cables west of them.

Hobbs and Burgess Islets lie at the north-east part of the channel, 2 cables from the west side of Vargas island, and nearly connected with it at low water; they are small, and may be approached to 2 cables, where are from 7 to 8 fathoms water.

* It lies S.S.W. $\frac{1}{2}$ W. from the north summit of the Cat-face range.

Sea Otter rock lies at the south-west entrance point of Ship channel, 2 miles W. by N. from Bare islet; it is very small, only 6 feet above high water, and there are 5 fathoms close-to off its east side.

Shark Reefs, some of which cover, while others are 6 and 10 feet above high water, lie on the west side, 2 miles N.E. by N. of Sea Otter rock; they are about 3 cables in extent, and should not be approached nearer than 2 cables on their south and east sides; between them and Sea Otter rock there are from 14 to 24 fathoms.

Lawrence Islets, on the west side, nearly 8 miles from Sea Otter rock, are small, low, and wooded, but steep-to on the east side.

Bartlett Island, $\frac{1}{4}$ a mile westward of the Lawrence islets, is low and wooded; its shores are much broken, and a number of rocks extend from a $\frac{1}{4}$ to $\frac{1}{2}$ a mile on all sides of it, and the island ought not to be approached within the latter distance.

Twins Islands, at the north-west point of Ship channel, 4 miles from Sea Otter rock, are low, but wooded, and connected at low water; kelp extends 1 cable south of them.

Entering Clayoquot sound by Ship channel, (which latter will easily be recognised by Bare islet, Sea Otter rock, and a remarkable summit inland, the Lone cone*) round either Bare islet or Sea Otter rock at the distance of $\frac{1}{4}$ a mile, and steer up the channel with the Twins islands in line with the north summit of the Cat-face mountains bearing N.N.E. $\frac{1}{4}$ E.* Keep the above-mentioned mark on till within $\frac{1}{4}$ a mile of the Shark reefs, when haul more to the eastward for the west extreme of Vargas island, which may be rounded at a distance of 3 cables. If going on through Hecate passage into Hecate bay, to clear Half-tide rock keep Hobbs islet open west of Burgess islet S. by W. $\frac{1}{4}$ W., until the Twins come in line with the west Whaler island W. by S., when steer up the passage with that mark on astern, which will lead north of Half-tide rock and south of the North bank. When past the latter, steer through Deep pass, and anchor in Hecate bay midway between its entrance points in 9 or 10 fathoms.

During heavy south-westerly gales the sea is said to break right across Ship channel, between Lawrence and Hobbs islands."

Refuge Cove is a very narrow islet which runs about $1\frac{1}{4}$ miles in a N.N.W. direction. It is a convenient and easily accessible place of shelter to a vessel embayed near this part of the coast. There is good anchorage within it in 4 to 5 fathoms, and protection is afforded from all winds, although those from S.S.E. blow directly in. The entrance is narrow but clear of danger, with the exception of a rock 7 feet under water at nearly 2 cables length N.N.W. from the extremity of Sharp point; to clear this, it appears from the chart to be necessary to keep over to the western side as you sail in, after passing within the point of entrance.†

When approaching Refuge cove from westward and south-westward it will be necessary to look out for the Canoe reef, a ledge of rocks just south-westward of the entrance and $\frac{1}{4}$ of a mile westward of the extremity of Sharp point. It is $\frac{1}{10}$ of a mile from the shore, is 2 feet above the sea at high tide, and being steep-to on its south and west sides must be approached with great care. Between it and the land is no safe passage.

* See view D on Admiralty chart No. 584.

† See the plan of the cove in the chart No. 584.

"Entering Refuge cove from seaward, bring the entrance or Sharp point to bear N.N.W. $\frac{1}{2}$ W. and steer for it, so as to pass 1 cable west of the point; then keep close to the eastern shore and anchor in $4\frac{1}{2}$ or 5 fathoms, about 7 or 8 cables within the entrance." *Vancouver Island Pilot.*

HESQUIAT HARBOUR.—From Refuge cove the coast trends 7 miles in a W. by N. direction to Hesquiat bluff on the eastern side of Hesquiat harbour;—which will be easily recognised as it is a low wooded point with a shingle beach around it. The eastern shore of Estevan point, subsequently mentioned, forms the western side of the bay. The bay extends into the land about 4 miles N.N.W., and is at first upwards of 2 miles wide, it then increases a little in breadth but as its head is approached it contracts in width to less than a mile. The soundings within are from 5 to 9 fathoms, and across the entrance is a bar, 3 cables length wide, upon which is a depth of 4 fathoms. Depths of less than 5 fathoms throughout the bay are generally indicated by the presence of kelp. The shores of the harbour are low and wooded.

When entering give the shores a berth of more than $\frac{1}{4}$ a mile, till within the bar, when they may be approached to the entrance of 2 cables length. Hesquiat bluff especially, requires a wide offing, because a reef, dry only at low tide, extends from it $\frac{1}{4}$ a mile in a south-westerly direction; this reef has a depth of 5 fathoms close to its extremity. Having passed within the bar anchorage may be obtained in any convenient part, but the best place is near the centre of the harbour at about $\frac{1}{4}$ a mile from Boat basin at its head; here the depth is 8 to 7 fathoms, on sand.

Boat basin is a little creek having a depth of 4 fathoms. A stream falls into it from which good water may be procured if necessary.

Hesquiat harbour is of access to sailing vessels even with a foul wind. Although during strong south and south-westerly winds the sea breaks heavily upon the bar, the sea within is comparatively smooth; hence the anchorage is always safe. A landing is at all times practicable in Boat basin.

The mountains on the east and north sides of the harbour are very lofty. That named Leading mountain at the head of the harbour is 2726 feet high; if this peak is brought to bear N. by W. $\frac{1}{2}$ W., it will lead across the bar clear of all sunken dangers on either side, but directly over a small spot of 8 fathoms.

Estevan Point, on the western side of Hesquiat harbour, terminates in a low wooded projection, bordered by a sandy beach strewn with boulders. Its south-west point, Hole in the Wall, is in lat. $49^{\circ} 22' 7''$, long. $126^{\circ} 32' 32''$; it is so named on account of a remarkable gap in the trees at its extremity, which is conspicuous when viewed from the south-westward. At $1\frac{1}{2}$ miles due South from this gap the depth is 20 to 27 fathoms, sand stones and gravel, on an uneven bottom.

From the western side of Estevan point a ledge of rocks extends out upwards of a mile, and outside this at a short distant is a sunken rock, named Sunday rock; hence this side of the point must have a wide berth, indeed, it will not be prudent to approach it nearer than 2 miles. From the extremity of Estevan point to the entrance of Nootka sound the distance is 18 miles.

NOOTKA SOUND.—This extensive inlet contains some of the best sheltered and most commodious anchorages on the west coast of Vancouver island; it has however lost the importance that once attached to it. The inlet proper is a sheet of water of about 6 miles in extent, containing several

islands, and from its north and north-east sides deep narrow canals with precipitous shores extend into the land 7 to 18 miles. The depth over the sound is generally about 80 fathoms, but there are parts where there is much more water. In consequence of this great depth the middle of the sound is not suitable for anchorage, and vessels are obliged to seek the little bays and inlets formed by the shores and islets. The anchorages usually resorted to are Friendly cove (just within the entrance of the sound, on its western side); Marinas bay (on the same side of the sound at about 4 miles from Friendly cove); Plumper harbour (2 miles from Marinas bay, and at the entrance to Kendrick arm); Resolution cove (just within the sound, at the south-east end of Bligh island); Deserted creek (in Tlupana arm); and Head bay (at the northern termination of Tlupana arm);—it is however seldom that vessels enter the sound so far as to attain either Kendrick arm or Tlupana arm.

The entrance to Nootka sound lies between Escalante and Maquinna points, distant from each other 4 miles in a W. by N. $\frac{1}{4}$ N., and E. by S. $\frac{1}{4}$ S. direction. Escalante, the eastern point, is low and rocky, and has some small islets and rocks off it to the distance of upwards of a mile. Maquinna point is also low and wooded, and has at its extremity a remarkable bare-topped conical rock 60 or 70 feet high;—some rocks extend 8 cables from it in an easterly direction, and as there are also rocks along the coast from it eastward nearly as far as the entrance of Friendly cove, the shore ought not to be approached nearer than $\frac{3}{4}$ of a mile till near the latter place.

The narrowest part of the entrance to the sound is at Friendly cove, where the distance to Burdwood point, on the opposite shore, is only 2 miles. From this point to Escalante point the shore is bordered by rocks, and when entering the sound should have a berth of at least a mile until close to Burdwood point, which (as it is steep and clear of rocks with the exception of those at its base) may be rounded at $1\frac{1}{4}$ cable's length.

Bajo Point and Reef.—From Maquinna point the coast trends almost due West $6\frac{1}{2}$ miles to Bajo point, a low rocky projection forming the extreme south-west point of Nootka island; this point is outside the entrance to the sound, and is mentioned here because it, with its surrounding reef, is a prominent danger to vessels approaching the sound from westward. A ledge, named the Inner Bajo reef, lies $1\frac{1}{4}$ miles from the point in a southerly direction; the outer edge of this reef has a depth of 12 fathoms close to it, and it is believed that there is no safe passage between it and the shore. In addition to the rocks surrounding Bajo point, there is a very dangerous reef at about 3 miles S.S.E. from the point, upon which the sea breaks in heavy weather; it is named Bajo reef, is about 2 cables in extent, and from it Maquinna point bears N.E. by E. $\frac{1}{4}$ E., distant 6 miles.

Bajo reef has deep water of 8 to 10 fathoms at a very moderate distance from it, and as the sea does not always break over it, the greatest care is required when in its vicinity. The mark to clear it at the distance of $1\frac{1}{4}$ miles on its south-east side is Yuquot point, the east extreme of Nootka island, kept open eastward of Maquinna point, N.E. $\frac{1}{4}$ E.; and at $1\frac{1}{4}$ miles on its west side, Bight cone (a remarkable summit on the south side of Nootka island) kept well open west of Bajo point, N. by W.

Friendly Cove is about 2 cables in extent and sheltered from the sea by a small rocky high-water island on its east side. The entrance to it is from the north-eastward, and only a cable's length wide. The anchorage within is in from 9 to 5 fathoms, and of such limited extent that there is only

room for one vessel of moderate size to lie moored in the middle, though several very small ones would find shelter. The shores on both sides of the cove are rocky and about 60 feet high on the north side; at its head is a small space of clear cultivated flat land, around which during summer the natives build an extensive village.

If intending to anchor in this cove, round Observatory islet*, the east entrance point, close-to. A large vessel should moor with anchors S.S.W. and N.N.E., letting go the first immediately on entering the cove. Sailing vessels, unless with a fair wind, would find some difficulty in entering; if unable to shoot in, it would be preferable to warp or proceed further up the sound to Plumper harbour.

This place was visited in 1837 by Sir E. Belcher, R.N., who says, "We anchored in Friendly cove, Nootka sound, the very interesting point of Cook and Vancouver's operations. At first I doubted my senses, that so small a space could have occupied so much type, and until I had examined it myself in my boat, did not think that it could afford shelter to two vessels. However, by placing one anchor outside, one well in, and the stream cable to the rocks, the *Sulphur* became well secure, with the *Starling* within us. The greatest distance between any two points does not exceed a $\frac{1}{4}$ of a mile, and mostly rocky."

Marvinas Bay.—From Friendly cove the distance to Marvinas bay is 4 miles in a N.N.W. direction. The coast between is rocky, and in its south part has some islets at a short distance off and parallel to it. There are two small creeks with entrances too narrow for a vessel to enter; the northernmost of them, the Boca del Inferno, lies abreast the north part of the above-mentioned islands, and $1\frac{1}{2}$ miles from Friendly cove.

Marvinas bay is open to southward, and only large enough to admit a coaster; there is a large fresh-water stream at the head and just south of it, convenient for watering. In former times this bay was in considerable repute, for although further from the sea than Friendly cove, it possesses over it several advantages in point of security and accommodation. The land in its vicinity continues to be low to a greater distance than about Friendly cove, and is apparently composed of less rocky materials. The harbour being well protected against all winds, and its distance from the ocean preventing it being much affected by the swell, a vessel can ride in it in perfect security; and as there is a fair navigable channel from it in a southerly direction, a vessel can leave whenever the land wind prevails sufficiently to enable it to clear the sound, with infinitely more ease than from Friendly cove; out of which it is frequently necessary to first warp a considerable distance, and where there is anchorage not only in an inconvenient depth of water, but on an uneven rocky bottom, in addition to which, in the event of the wind suddenly setting strongly in from the sea, the situation becomes by no means pleasant. The departure from Friendly cove, although not difficult in summer, is said to be subject in winter to great inconvenience, and indeed danger, from the heavy sea that rolls in stormy weather into the sound, especially during the S.E. gales, against which, from its vicinity to the ocean, it is not sufficiently protected.

* The geographical position of this rock is lat. $49^{\circ} 35' 31''$, long. $126^{\circ} 37' 32''$. For Nootka sound, see the Admiralty charts Nos. 569 and 1916.

Plumper Harbour, a small bay on the east side of Nootka island, is about 8 cables in extent and affords good anchorage in 12 fathoms. It is protected on the east side by two small wooded islets from 80 to 40 feet high; on the west side the shore is rather swampy, and there are several fresh-water streams.

The passage between the two islets is clear; vessels may also pass northward of the northern one, passing it at a cable's length, and being careful to avoid a 10-foot reef which extends from the shore. When inside, there is room for a vessel to ride at single anchor. This is the best anchorage in the sound, its only drawback being its distance from the sea.

Resolution Cove is only a slight bend in the coast, and is a very inconvenient anchorage for large vessels, being exposed to south-westward. The bottom is deep and rocky. It is named after one of Captain Cook's vessels which was refitted here in 1778.

Deserted Creek is 2 miles long in a westerly direction, and at its entrance, on the north shore, is a cove, named Island bay (from the circumstance that there is an islet in its centre). The best anchorage in the creek is in 12 to 14 fathoms, at about $\frac{1}{2}$ of a mile from the stream which falls into its head; vessels may also anchor in Island cove, in 12 fathoms, on the west side of the islet. At both places there is good shelter from all winds.

Head Bay is nearly a mile long in a westerly direction and $\frac{1}{8}$ of a mile wide. At its entrance on the northern side are three small islets just above the surface at high tide, the inner one of which is connected to the shore by a sandy flat dry at low water. The anchorage is in 14 to 16 fathoms at about $\frac{1}{2}$ of a mile from the head of the bay, and is well protected from all winds.

In the bay eastward of Head bay, formed by Perpendicular head and the coast northward of it, vessels may anchor in 16 to 18 fathoms. Perpendicular head is very lofty, its summit being 2600 feet high.

Directions.—The land surrounding Nootka sound presents to the seaman in fine weather many striking features, which render it almost impossible for him to mistake the sound for any of the numerous islets on the west coast of Vancouver island. Estevan and Maquinna points are both low and have breakers off them; the peculiar shaped hill, Nootka cove, 1619 feet high, situated almost immediately behind Friendly cove, is a remarkable object, and when N.N.E. (the bearing upon which it would be seen when making the sound from seaward) is very conspicuous. Mount Lombard, behind Burdwood point is 3000 feet high; and E.N.E. from this is mount Albermarle, 8753 feet high. Conuna peak, in the interior behind the sound, in lat. $49^{\circ} 49\frac{1}{2}'$, long. $126^{\circ} 18'$, has an altitude of 4869 feet and can be seen from a considerable distance; its summit is steeply-shaped.

The soundings at the entrance to the sound vary from 60 to 40 fathoms. Southward of the entrance, and extending 6 miles westward of Estevan and Escalante points, is a bank of 22 to 80 fathoms, deepening gradually in a south-westerly direction. In the vicinity of Bajo reef, and westward of it, are from 20 to 27 fathoms; but at the distance of 7 miles southward from Nootka island is a depth of 40 to 60 fathoms. In fine weather, the natives will be met with in canoes in considerable numbers on these banks fishing for halibut, which are very plentiful along this coast.

Approaching the sound from southward, after rounding Estevan point steer about N.N.W. for the entrance, which will be easily distinguished by the rocks off Escalante and Maquinna points; keep about 2 miles from the eastern shore till past Escalante point, and then steer up in mid-channel into the sound.

If bound to Friendly cove haul over to the west side of entrance for Yuquot point, which may be approached to a cable's length; round the islets sharply, and anchor or moor in the cove, as most convenient, in from 9 to 5 fathoms.

If bound to Plumper harbour, after passing Yuquot point keep about $\frac{1}{4}$ a mile from the north-east side of Nootka island, on a N.N.W. or N. by W. course for a distance of 5 miles to the entrance of Kendrick arm; steer up the latter in mid-channel till abreast Plumper harbour, which may be entered by passing between Bold and Pass islets (the islets fronting it on its east side) or by going northward of the former. Anchor in 11 to 12 fathoms near the centre of the harbour.

Should it be desired to anchor in any of the anchorages within Tlupana arm, steer as before directed till within $\frac{1}{4}$ a mile of the entrance to Kendrick arm; haul then to the north-eastward, pass westward of Junction and Bligh islands, and steer up Tlupana arm in mid-channel, or close-to on either shore. Deserted creek and Head bay are clear of danger and may be entered without difficulty; if provided with the chart no directions whatever are necessary.

Entering Nootka sound from westward, on nearing Bajo point do not approach the south shore of Nootka island within 4 miles, nor shut in Bight cone with Bajo point N. by W. until Yuquot point comes open eastward of Maquinna point N.E. $\frac{1}{4}$ E., which will clear the Bajo reef; a vessel may then steer for the entrance of the sound, about N.E. by E., not approaching the shore between Maquinna and Yuquot points nearer than a mile, until abreast the latter, which may be rounded close-to; proceed then up the sound as before directed.

If beating into Nootka sound, when standing to the westward, keep Yuquot point open eastward of Maquinna point N.E. $\frac{1}{4}$ E., as this will keep a vessel well clear eastward of Bajo reef. In standing to the eastward do not approach Escalante point within $1\frac{1}{2}$ miles, nor bring Burdwood point northward of N. by E. until abreast it, when the shore may be approached close to. When standing towards Maquinna and Yuquot points on the west side, avoid bringing the latter to bear eastward of N.N.E. until abreast it, when it may be approached close-to.

Nootka sound is the easiest place of access on the whole of the west coast of Vancouver island, the entrance being nearly 2 miles wide in the narrowest part; and by attending to the above directions any sailing vessel may beat in or out of the sound. Provided with a chart, if the night be clear, it may be entered without risk by bringing the entrance to bear N.N.E., and in a steamer but little difficulty would be experienced in picking up the anchorages of Friendly cove and Plumper harbour.

NUCHATLITZ INLET.—Point Ferrer, the west point of Nootka island, is a low and rocky projection, which may be readily recognised when viewed from westward by a remarkable hill 350 feet high immediately eastward of it; this hill has a conical summit, is known as the North-west cone, and is situated in lat. $49^{\circ} 44' 50''$, long. $126^{\circ} 58' 50''$. The depth at about 2 cable's length south-westward from the extremity of the point is 14 fathoms.

Nuchatlitz inlet runs into the shore of Nootka island north of Ferrer point, about 10 miles in a N.E. $\frac{1}{4}$ E. direction. It is 3 miles wide at the entrance and gradually narrows towards its head. Its shores are high and rocky and much broken into creeks and small bays, in some of which there is doubtless shelter for small vessels. The depth is 17 to 5 fathoms, the latter being in Mary basin at $6\frac{1}{4}$ miles from point Ferrer; in Inner basin, eastward of Mary basin, the depth is 40 to 18 fathoms.

The only place that can be recommended as an anchorage in the inlet is a small bay on its north side, named port Langford. The depth here is 8 to 5 fathoms. Vessels anchor at about $\frac{1}{2}$ a mile from its head in 6 fathoms, mud, and are well protected from almost all winds.

In the entrance to the inlet are several rocks and detached reefs; hence strangers should not attempt to enter without a pilot. There is generally a heavy sea over and about these reefs*.

ESPERANZA INLET.—This inlet lies between the north-west side of Nootka island and the main of Vancouver; it is about 16 miles long in a winding north-easterly direction, and its average breadth is about 1 mile, narrowing at the head, which is connected by a narrow pass, Tah-sis narrows, to the Tah-sis canal in Nootka sound.

The shores are nearly everywhere steep-to, rising on both sides to mountains of considerable height. The southern shore is indented by three bays of moderate extent, which however afford no anchorage; and from the northern one three arms of considerable length penetrate the Vancouver shore for several miles in a N.N.W. direction. In the western arm, named port Eliza, is the only anchorage within the inlet.

The soundings in the entrance vary from 12 to 20 fathoms, deepening within to upwards of 100 fathoms in many parts. Scattered about the entrance to this and Nuchatlitz inlet are the following dangers, Danger rock, Nuchatlitz reef, South reef, Blind reef, Needle rock, Middle reef, Low rock, Black rock, besides others between Catala island and Tat-chn point, the western limit of Esperanza inlet.

Danger Rock, situated upwards of a mile N.W. $\frac{1}{2}$ W. from Ferrer point, is the worst danger in the entrance to Nuchatlitz inlet, as it is of very small extent, and only breaks in heavy weather. It is steep-to on all sides, there being 11 fathoms close to it. Mark hill, at the head of the inlet, on with the north part of Fitz island bearing N.E. $\frac{1}{2}$ E. leads south of this rock, also midway between it and Ferrer point, and through the fairway into the inlet.

Nuchatlitz Reef, in the centre of the entrance to Nuchatlitz inlet and $\frac{1}{2}$ of a mile north of the Danger rock, is about $\frac{1}{2}$ of a mile long in an E.N.E. and W.S.W. direction, and a cable wide. This reef generally breaks, and at its inner extremity is a small rock awash at high water. There is a clear deep passage between it and Danger rock, and also one apparently northward of it, but neither should be attempted by a stranger, as no leading marks can be given for going through them.

South Reef.—This reef lies just within the entrance to Nuchatlitz inlet on the south side, at 1 mile N.E. by N. from Ferrer point and about 8 cables off shore; it is nearly 2 cables in extent, and covers at half flood. Mark hill, on with the north summit of Fitz island bearing N.E. $\frac{1}{2}$ E. leads 2 cables north of it.

Blind Reef lies at the south-east extreme of Middle channel, the principal entrance to Esperanza inlet. It is 9 miles N.W. $\frac{1}{2}$ W. from Ferrer point, is about 2 cables in extent, and only breaks in bad weather. At a cable's length northward of it is a small rock, and at the distance of 2 cables from its south and west sides is a depth of from 18 to 19 fathoms.

Needle Rock.—This small rock lies $\frac{1}{2}$ of a mile North of the Middle reef;

* See the Admiralty charts Nos. 580 and 569 for Nuchatlitz and Esperanza inlets.

at the distance of 2 cables length westward from it is a depth of from 14 to 16 fathoms.

Middle Reef, lies at the south-west entrance point of Middle channel and separates it from the North channel; it is about 8 cables long in a northerly direction, and a cable wide. This reef generally breaks, and at its south extremity is a small rock 4 feet above high water; this part of the reef lies 4 miles N.W. by W. $\frac{1}{2}$ W. from Ferrer point. The depth at about a cable's length from the reef on all sides is 5 to 20 fathoms.

Leading hill in line with Black rock N. by W. leads $\frac{3}{4}$ of a mile west of Blind reef, 1 mile west of Needle rock, $\frac{1}{2}$ a mile east of Middle reef, and through the fairway of Middle channel.

Low Rock.—This rock is distant nearly a mile due West from Middle reef, and the depth between is about 20 fathoms. It is 6 feet above water at high tide, and is steep-to. It is the outermost of the dangers off the south-west side of Catala island, and consequently most to seaward. From it the Twins islets bear N. by E. $\frac{1}{2}$ E., $1\frac{1}{4}$ miles; the space between is all foul ground,—among the rocks is the outer Black rock, 10 feet high.

Black Rock is a rock 20 feet above the surface at high tide, situated $\frac{1}{4}$ of a mile eastward of the east point of Catala island; between is no safe channel, and there is also foul ground at a cable's length south of it. The eastern side of this rock should not be approached nearer than 2 cable's length, nor should an attempt be made to go westward of it.

Half-tide and Obstruction Reefs, &c.—The space between Catala island and Tat-chu point, distant from each other $8\frac{1}{4}$ miles, is occupied by numerous reefs of which Half-tide and Obstruction are furthest from the land; hence it should always have a wide berth. Tat-chu point is in lat. $49^{\circ} 51\frac{1}{2}'$, long. $127^{\circ} 10'$; it is a cliffy projection of coast and has a reef at its base extending nearly $\frac{1}{2}$ a mile out. At $1\frac{1}{2}$ miles inland from the point is Eliza dome, a remarkable mountain 2819 feet high, which is a very conspicuous object from seaward.

Directions.—The reefs fronting Esperanza inlet form two channels, each having sufficient depth and breadth for the largest vessels; Middle channel is however the widest. It is only in the western arm of the inlet, port Eliza, that anchorage can be obtained, and here vessels may lie in perfect security from all winds. The usual and best place to ride in is at about $\frac{1}{2}$ a mile from its head, in 14 to 15 fathoms; but anchorage may also be obtained in Queen cove, a small inlet on the east side of the port at rather more than a mile from the entrance. The following sailing directions are from the *Vancouver Island Pilot*, and should be used in connection with the Admiralty charts already referred to.

"A stranger entering Esperanza inlet from the southward, through the Middle channel, and intending to anchor in port Eliza, should pass Ferrer point at a distance of about 8 miles, and keep on a northerly course till nearing the entrance of Middle channel, when steer to bring Leading hill in line with Black rock N. by W., which will lead through the fairway, and clear of the dangers on both sides of the channel. When the south point of Catala island bears W.N.W. the vessel will be inside the dangers at entrance, and should keep about N.N.E. for the entrance of port Eliza, passing from 2 to 8 cables east of Double island. In entering the port steer through Birthday channel, passing a cable east of Harbour island; when past the east point of the latter, keep about N.W. by N. for the entrance of Queens cove, or further

over to the eastern shore, to avoid Channel reef; in entering the cove, pass to the west of the island at its entrance, and moor immediately the vessel is inside, anchors N.W. and S.E.

If going to the head of port Eliza, keep on as before directed till within a cable of Queens cove, when haul sharply to the westward, keeping about 1 cable off the east shore, till Fairway island comes on with the east point of Harbour island S.E. by E., when the vessel will be west of Channel reef, and may steer up the port in mid-channel, anchoring near the centre, about 4 or 5 cables from the head, in 15 or 16 fathoms.

No sailing vessel of any size should attempt to enter port Eliza unless with a steady fair wind.

If bound to Rolling roadstead, enter the Middle channel as before directed, but instead of steering for the entrance of port Eliza, keep on a N. by W. or N. $\frac{1}{2}$ W. course, (passing about a $\frac{1}{2}$ of a mile east of Black rock,) until the outer extreme of the islets off the north-west part of Catala island comes open north of the low grassy point on its north side bearing W. by S., when haul in for the roadstead on that mark, which will lead midway between Arnold and Entrance reefs; anchor in 6 fathoms, with the extremes of Catala island bearing W.S.W. and S.E. by S.

Entering Esperanza inlet from the westward, keep an offing of $2\frac{1}{2}$ or 3 miles from Catala island (if Kyuquot hill be made out, by keeping it open west of Tat-chu point N.W. by W., a vessel will be well clear of any dangers off Catala island), till Double island comes in line with Black rock N. by E. $\frac{1}{2}$ E., and entering the inlet through the North channel with this mark on, which lead in clear of Danger. When the Twins island bear W. by N., haul more to the eastward, passing a $\frac{1}{2}$ of a mile outside the Mid and Black rocks, and steer for Rolling roadstead or port Eliza as before directed.

If the weather be clear and the marks can be made out, both North and Middle channels are equally good, the latter being wide enough for a vessel to beat through, though it would be a hazardous thing for a stranger to attempt, as no turning marks can be given.

Generally a heavy swell prevails off the entrance of the Nuchatlitz and Esperanza islets, and no sailing vessel should attempt to enter, or leave either of them, unless with a steady fair or leading wind.

Soundings from 20 to 40 fathoms will be found extending for nearly 20 miles westward from the entrances of Nuchatlitz and Esperanza inlets; to the S.S.W., at a distance of 10 miles off shore, are from 70 to 80 fathoms."

KYUQUOT SOUND.—From Tat-chu point the coast trends 7 miles in a W.N.W. direction to Rugged point on the eastern side of the entrance to Kyuquot sound. It is indented by several small bays, in some of which boats may find shelter; and, fronting it are some islets and reefs, so that it should always have a wide berth. The danger furthest to seaward, East Entrance reef, is $2\frac{1}{2}$ miles from the land, and has a depth of about 20 fathoms close to it; it is 4 feet above the surface at high tide.

The sound is a large broken sheet of water extending 14 or 15 miles inland in two large arms, and several smaller ones. The large island at the entrance, named Union, is 1484 feet high; it divides the entrance into two channels, of which the eastern one only is fit for large vessels; there are also several islands of smaller size within. The shores are generally rocky, and very much broken, rising to mountains 2000 and 4000 feet high.

The soundings outside the sound vary from 40 to 20 fathoms, generally on sand; at the entrance the depth is from 40 to 60 fathoms, but within the depths increase in many places to upwards of a 100 fathoms. There are three anchorages, Narrowgut and Easy creeks, and Fair harbour, the two latter being of considerable size but at a distance of 18 and 10 miles from the sea; the former is very small, and only 5 miles within the sound, on its eastern side.

The eastern (Kyuquot) channel leads into the sound eastward of Union island. It is nearly straight, about 5 miles long in a N.N.E. direction, and its breadth is little less than a mile. The soundings within it vary from 80 to upwards of 40 fathoms, increasing gradually to the inner part. When running through, keep in mid-channel and all danger will be avoided. It is however to be remarked that no sailing vessel should attempt the channel unless with a steady fair or leading wind, as generally a heavy swell prevails outside, which in a light wind would render her position critical; and no stranger should attempt to enter unless provided with the Admiralty charts (Nos. 583 and 717), the weather clear, and the leading mark for the channel well made out. This mark is the summit of Leading island midway between Rugged and Chat-channel points, bearing N. by E. $\frac{3}{4}$ E.

BARRIER ISLANDS.—Facing this part of the shore of Vancouver is a multitude of islets and rocks, which extend in some parts as much as 5 miles from the land. They commence at 2 miles westward from Tat-chu point, and continue for nearly 20 miles along the land in a W.N.W. direction, or as far as the inlets on the east side of Brooks peninsula. Through them are two known navigable channels, the Kyuquot (into Kyuquot sound) and Halibut (leading to Clan-ninick harbour) but as a rule no stranger should venture into them, or among the islands, unless the weather be clear, and there is a pilot on board.

Highest island, one of the Barrier group, lying 2 miles south of Union island, is a remarkable bare rock 98 feet high, and useful in identifying the Kyuquot channel. It is in lat. $49^{\circ} 57' 45''$, long. $127^{\circ} 21' 30''$.

Table island, on the east side of Halibut channel, is the largest of the Barrier islands, being nearly $\frac{1}{2}$ a mile in extent, and about 150 feet high; some rocks, mostly above water, extend $\frac{1}{4}$ a mile from its south side, the outer one being 50 feet high, with 15 fathoms 2 cables west of it. Trap bluff on the west side of the island is conspicuous.

Half a mile eastward of Table island is an anchorage for small vessels having a depth of from 4 to 6 fathoms. It is tolerably sheltered by some islands, and much used by coasters in summer months; the entrance to it being rather intricate, no stranger should attempt to enter.

In thick weather it is imprudent to stand nearer the Barrier islands than the depth of 40 fathoms.

OU-OU-KINSH AND NASPARTI INLETS.—These inlets are in the bay eastward of and under the broad and lofty promontory of which Cape Cook is the south-west extremity; Naspardi is the westernmost inlet. In neither is there anchorage except with winds from the land, and access to both is too difficult to be attempted by a stranger. Facing the approach to them are many rocks and detached reefs, causing heavy breakers when the wind blows strongly on shore. The outermost of these dangers, Sullivan reef, is a patch of rocks situated in lat. $50^{\circ} 4' 30''$, long. $127^{\circ} 41'$; it is nearly 8 miles outside the entrance of Ou-ou-kinsh inlet, $2\frac{1}{2}$ miles W. by S. from Clara islet,

and nearly 4 miles S.S.E. of Hat island in Nasparti inlet. This patch is about $\frac{1}{2}$ a mile in extent East and West, and steep-to—there being a depth of from 10 to 11 fathoms close around it.

The entrance to Ou-ou-kinsh inlet open N.N.E. leads $1\frac{1}{2}$ miles eastward of Sullivan reef; Solander island off cape Cook just open or shut in by the land east of the cape bearing West, leads $1\frac{1}{2}$ miles southward of it; Hat island, in the entrance of Nasparti inlet, in line with a summit on the west side of the latter bearing North, leads $1\frac{1}{2}$ miles westward of it; and Hat island seen between the Haystacks N.W. by N., leads $\frac{3}{4}$ of a mile north-east of it. The reef is extremely dangerous as it is only occasionally that the sea breaks over it.

BROOKS PENINSULA.—Westward of Nasparti inlet is Brooks peninsula, a lofty promontory of an oblong shape, which projects into the sea in a S.S.W. direction about 9 miles; its breadth is 5 miles. The shores are generally very rocky, and rise almost abruptly to upwards of 2000 feet, while its mountains are from 2500 to 8000 feet high. Off it are several dangers, some of which extend upwards of a mile from shore; of these, Banks reef at $\frac{1}{4}$ of a mile from its south coast, is dry until $\frac{1}{4}$ flood.

Cape Cook, the south-west extremity of Brooks peninsula, and the most projecting point of the outer coast of Vancouver island, rises abruptly from the sea to a summit 1200 feet high. At nearly a mile westward from it, lies Solander island, which is bare, 580 feet high, and has two sharp summits; between it and the cape the channel is filled with rocks, hence no attempt should be made to go eastward of the island. Solander island is in lat. $50^{\circ} 8' 31''$, long. $127^{\circ} 57' 20''$.

The depth at about 2 miles off cape Cook and at the same distance off the south side of the peninsula, is 20 to 90 fathoms; as a rule no vessel should approach nearer.

Brooks Bay.—The bay on the north-west side of Brooks peninsula is about 12 miles wide, and 6 miles deep. In it are several rocks above and under water, upon which account it should not be entered. In its two inlets, Klaskish and Klaskino, vessels may anchor but as these anchorages are difficult of access, no shipmaster should attempt to enter either unless embayed and unable to get out of the bay. Brooks bay is quite open to all winds from westward, and when these prevail with any strength a tremendous sea is sent in.

Clerke Reefs.—At about 5 miles northward of cape Cook are two islets, Single and Double, of which the latter is distant from the shore about a mile. Outside these are Clerke reefs, a cluster partly above the surface, extending 2 miles from the land and occupying an extent of fully 2 miles; these reefs are extremely dangerous, and should always have a wide berth,—to clear them at the distance of a mile on the west side, do not approach them nearer than when the extremity of cape Cook bears S.S.E. $\frac{1}{4}$ E; and at the distance of $1\frac{1}{2}$ miles on the north side, Small islet, on the north side of the entrance to Klaskish inlet, should be brought in one with Leading cone, a hill 500 feet high situated at the head of the inlet, N.E. by E. $\frac{1}{4}$ E.

Ship Rock.—This is a rock of very limited extent situated about 8 miles N.N.W. from Clerke reefs, and in nearly the centre of Brooks bay; it is consequently 2 miles from shore, and from its position a very dangerous reef to vessels bound into either Klaskino or Klaskish inlets. The depth close to its southern and eastern sides is 17 to 20 fathoms, and upon it the sea

generally breaks heavily. To clear it at nearly $\frac{1}{4}$ of a mile on its *south* side, bring Small islet in line with Leading cone (already mentioned) N.E. by E. $\frac{1}{2}$ E.; and at nearly 2 miles on its *north-west* side, Twenty-foot rock (at the entrance of Klaskino inlet) in line with the lower part of the strike on Red Stripe mountain (on the north shore of that inlet) N.N.E. $\frac{1}{4}$ E.

QUATSINO SOUND is at about 8 miles north-westward from Klaskino inlet, round a projecting point of land, of which Lawn point (a low shore, having rocks extending from it about $\frac{1}{2}$ a mile in an easterly direction) is the extremity. Immediately within Lawn point the land is very lofty, being about 1900 feet high; the depth at a short distance outside the rocks is 10 to 20 fathoms.

Quatsino sound is an extensive and very deep inlet, containing in many parts good well-sheltered anchorages. The shores are generally lofty, and near the sea very irregular; Gap mountain, on the east side of entrance rises in two peaks, of the respective heights of 2204 and 2088 feet; the mountain over the west point of entrance is not less than 1275 feet high; and Nose peak, on the north side of the entrance is 1780 feet high, and easily recognised by its sharp rocky summit. These lofty mountains render it by no means difficult to distinguish the entrance, especially when viewed directly from southward.

The extent of Quatsino sound is upwards of 25 miles in a north-easterly direction. The breadth is at first nearly 6 miles, narrowing to less than a mile at a distance of 5 miles within; it then runs in a north-easterly direction 18 miles, when it branches off in two arms, one extending to the south-easterly for 12 miles, and terminating in low land. The other lies northward of, and is connected with, the sound by a straight narrow pass about 2 miles long; its length is 22 miles in an east and west direction, and the eastern extreme, Rupert arm, is only 6 miles distant from Hardy bay on the north-east side of Vancouver island; the western part terminates within 12 miles of San Josef bay on the outer coast. Just within the entrance of the sound on the north side is Forward inlet, a much smaller arm, about 6 miles long in a northerly direction, and containing the best anchorages of the sound.

The soundings in the entrance, and from 8 to 5 miles outside, vary from 80 to 70 fathoms, but within they deepen in many places to upwards of 100 fathoms. There are several dangers along the south shore at the entrance; in the fairway are two very dangerous rocks, which only break in heavy weather, and it requires great caution on the part of the navigator to avoid them when entering or leaving the sound.

Tides.—It is high water, full and change, in Quatsino sound at 11h.; the rise and fall of tide is about 11 feet.

The islands and reefs at the entrance to Quatsino sound are the following:—Danger rocks, Entrance island, Pinnacle island, Surf islets, Bare islet, and Pilley shoal. Within Forward inlet on the western side are Low islets and Robson island.

Danger Rocks.—These small rocks are at about a mile within the entrance, nearly in the fairway, and consist of two very dangerous pinnacles steep to on all sides. North Danger lies 7 cables E.N.E. from Entrance island, and breaks at low water. South Danger is $\frac{1}{4}$ a mile S.E. of the north rock, and is awash at low water spring tides;—there is deep water between them.

Pinnacle islet in one with the east point of Low islands (in Forward inlet), bearing N.N.W. $\frac{1}{4}$ W., leads nearly 4 cables length *westward* of Danger rock,

and midway between the north rock and Entrance island. Robson island in Forward inlet, open north of Entrance Mount point N.W. by W. $\frac{1}{2}$ W., leads 8 to 4 cables *eastward* of the rocks. Village islet, on the east side of Forward inlet, just touching Brown point, N.W., leads about $\frac{1}{2}$ of a mile *eastward* of them, and midway between them and the Surf islands. Bedwell islets, within the sound on the north side, open north of Bold bluff bearing N.E., leads a $\frac{1}{2}$ of a mile *northward* of North Danger rock; and Bold bluff in line with the gap in the centre of Surf islands, bearing N. by E. $\frac{1}{2}$ E., leads nearly a mile *south-eastward* of South Danger.

As the sea very seldom breaks over Danger rocks, great caution is required when entering or leaving Quatsino sound, to avoid them. Between the rocks and Surf islands the passage is $1\frac{1}{2}$ miles wide, and clear of danger.

Entrance Island is a small rocky islet, about 140 feet high and covered with a few stunted trees, situated on the north-west side of the entrance to the sound at about a cable's length from the shore. It is steep-to on its south-east side, there being a depth of 16 to 22 fathoms at a very short distance from it. The narrow channel between it and the shore is filled with rocks, but it is sufficiently deep to permit the passage of boats. The geographical position of the island is lat. $50^{\circ} 26' 30''$, long. $128^{\circ} 9'$.

Pinnacle Island.—This is a little islet $\frac{1}{2}$ of a mile northward of Entrance island, and on the same side (the western) of the entrance to the sound. It is a small jagged rock about 40 feet high, having a few trees on its summit. Its distance from the shore is 2 cables, and at a cable's length from its east side is a depth of 15 fathoms. When off this islet Forward inlet appears open.

At rather more than $\frac{1}{2}$ a mile from Pinnacle islet in an E.N.E. direction, is a rock having 8 fathoms over it, close to which is a depth of 18 to 80 fathoms. It lies in the fairway to Forward inlet, and being so much below the surface is not dangerous.

Surf Islets.—These consist of a chain of small islands about 1 mile long in a N.W. and S.E. direction, situated upwards of a mile S.S.W. from Bold bluff, and 8 miles within the entrance to the sound; they are consequently nearly in mid-channel. Some of them are covered with a few stunted trees, and are about 40 feet above the surface at high tide; a short distance from them are a number of breaking rocks, and at only 3 cables from their south and west sides is a depth of from 10 to 80 fathoms. Although there appears to be deep water between these islands and the east side of the sound, it is not advisable to go through that passage, as it has not been sufficiently examined.

Bare Islet lies off the north shore of the entrance to the sound, at a little eastward of the entrance to Forward inlet. It is a very small bare rock, only 12 feet above the surface at high tide, and almost close to it is a depth of 24 fathoms. The passage between it and the shore is not more than $1\frac{1}{2}$ cables' length wide, and too shallow for anything larger than boats.

Pilley Shoal is a small patch of 8 fathoms, situated off the north shore of the entrance to the sound at about a mile north-eastward from Bare islet; from it Bold bluff bears almost due East, distant 1 mile. It is $1\frac{1}{2}$ cables' length from the shore, has a depth of 10 to 12 fathoms almost close to it, and is marked by kelp.

Low Islets.—These are small wooded islets situated nearly a mile within the entrance to Forward inlet, on its south-western side. They are steep, and close to them on all sides is a depth of 17 to 20 fathoms.

Robson Island is about $\frac{1}{2}$ a mile north-westward from Low islets, on the same side of the inlet. It is about $\frac{1}{2}$ a mile in extent, 885 feet high, and is separated from the western shore by a narrow channel of 12 to 27 and 80 feet. Its shores are rocky, and on its north and east sides free from danger beyond the distance of a cable's length. On the western side of this island is North harbour, in which is excellent anchorage.

Forward Inlet.—On the north side of Quatsino sound at a mile within the entrance, is the arm known as Forward inlet. This inlet is about 6 miles long, first taking a north-westerly direction for 2 miles from its outer part, then turning to the N.N.E. for 4 miles and contracting in breadth as it approaches its head, where it terminates in large salt-water lagoons. The breadth at the entrance is about a mile, but in the upper part it contracts to less than a $\frac{1}{2}$ of a mile in some places. Within it are two anchorages, named North and Winter harbours, in which vessels may ride in perfect security and be sheltered from almost all winds.

North Harbour, as already mentioned, is on the west side of Robson island, and its position makes it the most convenient of the anchorages is Forward inlet. Its extent is nearly $\frac{1}{2}$ a mile, and within it is a depth of from 4 to 6 fathoms. The entrance is 3 cables wide, and easy of access to sailing vessels. The western part of the harbour takes the name of Browning creek; this part is $1\frac{1}{2}$ miles long, but very narrow, with from 2 to 5 fathoms water, and terminates in a shallow basin, dry at low water.

On the north side of the entrance to North harbour, is Observatory islet, a small bare rock connected at low water to the main; its geographical position is lat. $50^{\circ} 29' 25''$, long. $128^{\circ} 8' 39''$.

Winter Harbour comprises the N.N.E. part of Forward inlet and is a capacious anchorage having a depth of from 8 to 11 fathoms. Its shores are low and bordered by a sandy beach, and the harbour becomes shoal at a distance of a mile from the head; its breadth varies from 2 to 6 cables.

Log point, just outside the entrance on the east side, is low, and bordered by a sandy beach. Southward of this point, and extending 4 cables from shore, is New bank, with $8\frac{1}{2}$ fathoms on the shoalest part, which contracts the breadth of the entrance passage to the harbour to less than a cable; when running in keep a little over to the west side as soon as abreast North harbour, by which means this bank may be avoided and Winter harbour entered without danger.

At the narrowest part of the entrance to Winter harbour, on the west side, is a low grassy point bordered by a sandy beach and steep-to, there being 16 fathoms within $\frac{1}{2}$ a cable of it.

Koprino Harbour.—At about 8 miles within the entrance of Quatsino sound, in the centre of a bay on the north side of the sound, is Koprino harbour, a perfectly land-locked but small anchorage, sufficiently capacious to accommodate one or two ships. It lies northward of Plumper island, which is about $\frac{1}{2}$ a mile in extent, low, wooded, and steep-to on all sides, there being a good passage on either side of it into the harbour.

Dockyard Island, in the west part of the harbour, midway between Plumper island and the north shore, is small, but may be closely approached. The least water between it and Plumper island is 4 fathoms;—at about $1\frac{1}{2}$ cables north-eastward of it, in the middle of the harbour, is a small patch of 15 feet, known as the mud bank. There is good anchorage at a cables' length southward of Dockyard island, in 14 fathoms.

Wedge Island lies at the eastern limit of the anchorage at about a cables'

length northward of Plumper island. It is very small, covered with a few bushes, and there is a deep passage into the harbour close to it on either side.

Observatory Islet.—At the north-east extremity of the harbour, is a bare rock about 12 feet high named Observatory islet. It is 2 cables northward of Plumper island, and 8 cables from the north shore to which it is connected by a bank dry at low water. The geographical position of this islet is lat. $50^{\circ} 30'$, long. $127^{\circ} 52' 16''$.

East Passage leads into Koprino harbour, eastward of Plumper island. It is $\frac{1}{2}$ a mile wide at the entrance, narrowing to 2 cables at its termination, is clear of danger, and the soundings in it vary from 15 to 80 fathoms. East cove, in its north-east part, appears to afford a good anchorage in 6 to 10 fathoms; but the entrance to it has hardly been sufficiently examined to recommend its being used by a large vessel. Prideaux point, the east entrance point of East passage, is low, bordered by a sandy beach, and may be approached to a cable's distance.

Directions.—The following instructions for Quatsino sound are from the *Vancouver Island Pilot*. For a full detailed description of the sound and its inlets, reference should be made to that work, and also to the Admiralty charts Nos. 582 and 570.

"*Entering Quatsino sound from southward*, give Reef point, its south-eastern entrance point, an offing of about 2 miles, and steer North till Bold bluff comes in line with the gap in the centre of the Surf islands, N. by E. $\frac{3}{4}$ E., which mark kept on will lead south-eastward of Danger rocks; when the west side of Robson island comes open north of Entrance Mount point in Forward inlet, N.W. by W. $\frac{1}{2}$ W., or Village islet (on the east side of that inlet) is just touching Brown point, bearing N.W., a vessel will be well east of these rocks. If bound up the sound, round the north end of Surf islands at a distance of about $\frac{1}{2}$ a mile. If going to Forward inlet, steer about N.W. by W., taking care not to shut in the south side of Robson island with Entrance Mount point, until Bedwell islets come open north of Bold bluff, bearing N.E., when she will be well north of the Danger rocks. Pass from 1 to 2 cables off the east sides of Low and Robson islands, and rounding the north point of the latter, at the same distance, enter North harbour, and anchor in from 4 to 6 fathoms near its centre.

If intending to anchor in Winter harbour, when abreast the north part of Robson island, steer N.N.W., keeping well over to the west shore to avoid New bank, and when past it enter the harbour in mid-channel, anchoring in 11 fathoms at about $\frac{1}{2}$ a mile north of Grass point.

Winter and North harbours are the best anchorages in Quatsino sound, and easily available for sailing vessels, which could beat into the latter harbour. As they are situated near the entrance to the sound their position is very advantageous.

Bound to Koprino harbour, which can only be entered by steamers or sailing vessels with a fair wind, round the north-west point of Surf islands at about $\frac{1}{2}$ a mile distance, and steer up the sound in mid-channel until abreast the harbour. If in a large vessel, go through the East passage, keeping from 1 to 2 cables off Plumper island; enter the anchorage close-to on either side of Wedge island, and moor immediately the vessel is west of it,—anchors north and south. A vessel may also enter by West passage, and anchor in 14 fathoms south of Dockyard island.

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best guide, and a mid-channel course is everywhere free of danger; sailing vessels of any size should not, however, go eastward of that harbour, as the anchorages beyond are rather difficult of access for them. If wishing to anchor in Hecate cove, enter it in mid-channel, passing north of Limestone island, and moor immediately the vessel is inside the entrance points; the tide runs from 1 to 3 knots abreast the entrance, and should be guarded against.

Going through Quatsino narrows, keep well over to the north shore, pass north of Round island, round Turn point close-to, and guarding against the tide, steer up the narrows in mid-channel. These narrows ought not to be attempted except at slack water or with a favourable tide, unless in a full-powered steamer.

The best anchorage north of the narrows is Coal harbour in West arm. If wishing to go there, a N.W. course for 2 miles from the narrows will lead to its entrance; a vessel may anchor near its centre in from 12 to 14 fathoms. In navigating West arm keep well over to the south shore, when in the vicinity of the Pot rock and Stragglings islands.

Entering Quatsino sound from westward, give the coast an offing of about 2 miles, till Entrance island bears N.E. or N.E. by N., when steer to pass about 2 cables eastward of it, but not further off. When abreast it haul to the northward, bringing Pinnacle islet in line with the east side of Low islets, bearing N.N.W. $\frac{3}{4}$ W., and steer up with that mark on till Bedwell islets come well open northward of Bold bluff, bearing N.E., when Forward inlet may be entered, or you may proceed further up the sound, as before directed.

If, when coming from southward, Pinnacle and Low islets can be well made out, a vessel by keeping the former in line with the east part of the latter, bearing N.N.W. $\frac{3}{4}$ W., will pass 3 cables westward of Danger rocks; but as a rule it would be more prudent to go eastward of them.

If the weather be so thick that the marks for clearing Danger rocks cannot well be made out, a vessel, if able to distinguish Entrance island, may enter the sound by steering for it on a N. by E. or north-easterly bearing; pass close to its east side, and haul to the northward when abreast it; by keeping $\frac{1}{2}$ a mile on that course, she will be well clear north-west of Danger rocks, and may proceed anywhere up the sound. On a clear night in fine weather a vessel may also enter in the above manner.

There is room, with a steady breeze, for a smart working vessel to beat into the sound southward and eastward of Danger rocks, though without previous knowledge of the place it would be rather hazardous to attempt it. If obliged to do so, when standing northward towards Danger rocks, tack when Bold bluff comes in line with the centre of the northernmost (wooded) Surf island, bearing N.N.E. $\frac{1}{2}$ E.; and when standing to the south shore, tack when Bold bluff comes in line with the south-east extreme of the Surf islands bearing N. $\frac{3}{4}$ E. or N. by E. When the south side of Robson island comes open north of Entrance Mount point, N.W. by W. $\frac{1}{4}$ W., she will be eastward of Danger rocks, and may stand further to the northward.

Beating between Surf islands and Danger rocks, tack at about 3 cables off the former: and in standing towards the latter, keep Robson island open as before directed, till Bedwell islets come open northward of Bold bluff, N.E. If going to North harbour, when inside Forward inlet, guard against New bank."

The Coast.—From Quatsino sound to cape Scott, the north-west extremity of Vancouver island, the coast trends W.N.W. about 26 miles. It is in

general rocky and iron-bound, and from its projecting points sunken ledges extend a considerable distance, hence it is always prudent to give this coast a wide berth,—an offing of at least 2 miles is recommended. The mountains over the cliffs are occasionally more than 1000 feet high; of the headlands cape Palmerston, in lat. $50^{\circ} 86' 45''$, rises to the height of 1422 feet and has rocks at its base to about $\frac{1}{4}$ a mile out, immediately beyond which is a depth of 8 to 10 fathoms.

SAN JOSEF BAY.—This inlet is on the north-west side of cape Palmerston, and should only be used as an anchorage when the wind is from the land. It extends 8 miles in a north-easterly direction, and has a breadth at the entrance of nearly 2 miles, narrowing gradually towards its head. Its shores are high, and off the south side are several isolated rocks. Although the depth of the bay is 11 to 4 fathoms, it affords shelter only with northerly winds, and should not therefore be used as a stopping place unless the weather be fine; generally a heavy sea sets into it, and a vessel caught there with a south-westerly gale would inevitably go on shore. At its head, on the south side, is a stream of considerable size, which boats can enter at high tide.

The best place of anchorage in the bay is near the middle in 7 or 9 fathoms with the entrance points bearing South and West.

SEA OTTER COVE.—Outside the entrance to San Josef bay, on its north-west side, is a cluster of islands about 40 feet high, bare and yellow-topped, which with the coast northward of them form a little bay, known as Sea Otter cove. This bay extends into the land about a mile in a northerly direction, and is not more than $\frac{1}{4}$ of a mile wide. It has a depth of 5 to $1\frac{1}{2}$ fathoms, and is exposed to southerly winds. There are several sunken rocks within it, and the shelter is very indifferent; it should be entered only by those well acquainted with its dangers.

Sea Otter cove is formed on its west side by cape Russell, a remarkable headland 810 feet high, which is very conspicuous, especially when viewed from north-westward as it stands out from the general line of coast. This cape must be rounded with very great care, on account of some sunken rocks which run off from it about a mile in a southerly direction. From this headland to cape Scott, there is no place of shelter, and the bold coast frequently rises to the height of 600 feet.

The soundings off shore between Quatsino sound and cape Scott are deep, as might be inferred from the mountainous character of the adjoining land. At the distance of 2 miles the depth is 20 to 80 fathoms, sand and rock, and this deepens to 100 fathoms at 10 to 11 miles out; southward of Scott islands the depth of 100 fathoms is probably not more than 6 miles from them.

CAPE SCOTT is a bold headland 500 feet high, which will be recognised at once from whatever direction it may be viewed; for when bearing due East the sea will be observed to wash its north and south sides, and when bearing either North or South, the low sandy neck immediately behind it, (only a cables' length wide, and which connects it to the shore of Vancouver) makes it appear almost isolated. Its geographical position is lat $50^{\circ} 46' 41''$, long. $128^{\circ} 26' 45''$. The country in the vicinity of the cape is not so lofty as that along the coast we have been describing south-eastward of it.

Cape Scott should always have a wide berth given to it because of the rocks at its base, which extend out nearly $\frac{1}{4}$ of a mile; as these are steep, with a

depth of 15 to 20 fathoms almost close to them, more than ordinary care is required when in their neighbourhood. The flood here comes from the southward, and rounding the cape sets into Goletas channel, its strength varying from 1 to 3 knots.

There is anchorage for boats and small craft in each bay on the north and south sides of the cape, formed by the sandy isthmus, but in neither is it safe to remain when there is a prospect of bad weather. The south bay has a depth of 5 to 2 fathoms, is exposed to South winds, and facing it is a cluster of rocks, some of which are 10 feet high. There is also shelter for boats in a little creek among the rocks immediately west of the south bay; it is difficult of access, but affords protection when within even against southerly gales.

SCOTT ISLANDS.—The highest part of Cox, the easternmost island, is $5\frac{1}{2}$ miles W. by S. $\frac{1}{4}$ S. from cape Scott. The channel between this island and the shore of Vancouver is safe and believed to be free from sunken dangers, with the exception of those already mentioned as surrounding cape Scott; its depth is from 19 to 40 fathoms. The tide runs through it at the rate of 1 to 5 knots, and there are some strong tide rips on its east and west sides. When beating through do not approach the shore of Cox island nearer than $\frac{1}{2}$ a mile, nor that of cape Scott nearer than $1\frac{1}{2}$ miles.

The islands extend from Cox island about 20 miles in a westerly direction, the west point of Triangle island (the furthest to seaward) being in lat. $50^{\circ} 51' 53''$, long. $129^{\circ} 6' 32''$, and $25\frac{1}{2}$ miles W. by S. $\frac{1}{4}$ S. from cape Scott. They are five in number, and reckoning from eastward are named Cox, Lanz, East Haycock, West Haycock, and Triangle; but adjacent to them are some smaller islets or rocks. The depth along their north sides, at the distance of 2 miles, is 30 to 50 fathoms; at 2 miles westward of Triangle island it is 45 fathoms, and at 5 or 6 miles southward from them 80 to 100 fathoms.

Cox Island has an extent of about $2\frac{1}{2}$ miles. It is the largest of the islands, and rises to the height of 1047 feet. Its shores are very bold, and should not be closely approached because of detached rocks and sunken reefs. Vessels in fine weather occasionally anchor off the north shore in 14 fathoms; but it is safe to do so only when the wind is from southward.

Lanz.—This island is distant from Cox island about $\frac{1}{2}$ a mile; the channel between is 17 fathoms deep in the middle, but should be used only on an emergency, as the shores on each side is rocky. Lanz is 2 miles long in a westerly direction, 1 mile broad, and is the highest of the Scott islands,—its summit being 1177 feet above the sea.

East Haycock is $2\frac{1}{2}$ miles south-westward from Lanz island; it is very small, has a rugged outline, and is covered with a few stunted trees. Some islets or rocks extend a short distance N.W. from it.

West Haycock is distant 5 miles W. $\frac{1}{4}$ S. from East Haycock. It is small and rocky, and about 180 feet high; some small inlets extend upwards of a mile south-westward from it, foul ground existing around them for $\frac{1}{2}$ a mile.

Triangle, the westernmost of the Scott islands, is 26 miles W. by S. from cape Scott. It is 680 feet high, about a mile in extent, and differs from the other islands in being very precipitous, and bare of trees, and has a remarkable gap in its summit. A ledge or reef extends 1 mile north-west from it; eastward of it are three low islets, the outermost of which, 40 feet high, is $1\frac{1}{2}$ miles from the island; there are also two islets at a short distance from its south side.

The Scott islands have not been closely examined, but it is known that strong tide ripples and overfalls prevail in the channels separating them. Upon this account, and also because these channels have not been sounded, vessels should abstain from venturing near or among them. The flood sets northward and the ebb southward through the islands, and at times with considerable strength.

QUEEN CHARLOTTE ISLANDS.

These islands although among the British Possessions are but little known, and the few shipmasters who have visited them have scarcely increased our acquaintance with them. The following remarks are almost entirely from a hydrographic notice by Mr. George H. Inskip, R.N., of H.M. steamer *Virago*, 1858.*

GENERAL REMARKS.—The Queen Charlotte islands, so named in 1787 from the vessel commanded by Captain Dixon, one of the earlier explorers of the group, extend 160 miles in a N.N.W. and S.S.E. direction. The greatest breadth of the islands at their extremity, is about 60 miles, whence it gradually diminishes to Cape St. James, their southern extremity, where it terminates in a point,—giving the whole chain of islands a wedge shape form. The group, consisting of three principal islands and several smaller ones, is situated between latitudes $51^{\circ} 57'$ and $54^{\circ} 21'$, longitudes $181^{\circ} 11'$ and $183^{\circ} 0'$. The channels separating the larger islands are named Houston Stewart and Skidegate; the former channels run between Prevost and Moresby islands, and the latter between Moresby and Graham islands.

The natives are probably not numerous. It is reported that they hold slaves, and frequently treat them very cruelly. They are fond of travelling, and make voyages of several hundred miles in their canoes, visiting Sitka to the north, and Victoria harbour (Vancouver) to the south.

Halibut, salmon, herrings, and several other descriptions of fish abound among the islands, and off their coasts; and immense flocks of wild geese and duck at times visit them. Potatoes grow in abundance in most parts, and thrive exceedingly well, forming an important article of food. These are all to be bought either for money, strong cotton shirts, cotton dresses, plain cotton, knives, tobacco, mother of pearl jacket buttons for ornamenting their blankets, or any of the articles commonly bartered among savages.

Bears are very numerous, and with martens, sea and land otters, are caught for their furs, which are taken to the H.B. Co.'s establishment at Fort Simpson (port Macleochlin), or to Rupert fort (Beaver harbour) in Vancouver island.

CAPE ST. JAMES, so named by Mr. Dixon from the saint's day upon which it was first seen, is the southern extremity of Prevost island; its approximate geographical position is lat. $51^{\circ} 57'$, long. $181^{\circ} 2'$. The land about it has very moderate elevation; but, similar to that in the northern part

* The variation allowed is 26° E. Reference should be made to the Admiralty charts Nos. 2430 and 2168.

See also the interesting remarks upon the islands by Mr. Inskip in the *Nautical Magazine*, 1855, and those by the officers of H.M.S. *Virago* in the *Nautical Magazine*, 1854.

of the islands, it rises gradually to the rugged and uneven mountains, which occupy the centre of the group. When approaching the islands from southward, it is the high land behind the cape that will be first seen. The cape is formed by several islets and rocks, and until the sea in its vicinity is examined, must be approached with extreme caution, for it is said that a sunken ledge extends from it 8 to 5 miles between the directions of S.S.E. and S.E., the edges of which are probably steep.* With the cape bearing W. by S. $\frac{1}{2}$ S. about 8 $\frac{1}{2}$ miles, and the outermost rock above water S.W. $\frac{1}{4}$ S., a east of 90 fathoms has been obtained.

HOUSTON STEWART CHANNEL.—From cape St. James the eastern coast of Prevost island is much broken, with one round thickly wooded and conspicuous island and several little islets and rocks along it, and trends nearly N.W. to a well defined headland, which after rounding the eastern entrance to Houston Stewart channel and Rose harbour will open out. At about 4 miles from the entrance there are 90 fathoms water, and the depth gradually shoals to 20 fathoms to within a mile of it; from this distance off, the soundings are very irregular, varying from 80 to 7 fathoms, over a series of ridges or bars of rock, sand, shell, and mud.

Entering from Eastward.—In the eastern entrance to this channel, which is about $\frac{1}{2}$ of a mile wide, there are 20 fathoms water. Within Forsyth point, on the north side of the entrance, is a snug bay, bordered by a sandy beach, in which, at nearly $\frac{1}{2}$ of a mile from Forsyth point, and at $\frac{1}{2}$ of a mile from the beach, is a very secure and convenient anchorage in 16 fathoms.

At a $\frac{1}{2}$ of a mile inside Forsyth point, and a little to the northward of the line of direction of the channel, is a rocky patch with kelp, having only 1 fathom on it; a vessel therefore should not haul to the northward too soon after entering. On the southern side of the channel are some small wooded islands, here and there fringed with outlying patches of kelp, which latter should always be avoided. W.S.W. $1\frac{1}{2}$ miles from Forsyth point is the Trevan rock, lying nearly mid-channel, and contracting the passage on its northern side to rather less than $\frac{1}{2}$ a mile; patches of kelp and the largest of the islands before mentioned render the other side impassable, excepting for boats; close to the north side of this rock the depth is 7 fathoms. At a mile farther in, the channel branches off both to the northward and southward.

Entering from Westward.—The southern arm of Houston Stewart channel is about 8 miles long, and $\frac{1}{2}$ of a mile wide, with several small islands at its southern end or entrance from the Pacific. The shores of both sides are bold and densely wooded. A vessel coming from the southward and wishing to go in by this entrance, when abreast cape St. James, should close the land to $1\frac{1}{2}$ miles, and after coasting it for about 12 miles, the entrance will open out. After passing a convenient distance southward of the largest and outer island at the entrance, named Anthony island (off the southern end of which an extensive ledge of rocks projects in a south-west direction) the channel will show itself; the other islands are all wooded; a bare flat rock which lies much nearer the western than the eastern side, and which should be kept on the port hand, will be a good guide. There is an Indian village of the

* Mr. Gray of the *Columbia* informed Vancouver that he had struck and received material damage upon a sunken rock at a much greater distance from the cape than a league, though in the same direction as that mentioned, between S.S.E. and S.E.

Shangoi tribe on St. Anthony island; the natives are very wild, and persons visiting or trading with them should be on their guard.

Rose Harbour.—This secure and capacious harbour forms the northern arm of Houston Stewart channel. It runs up in a northerly direction for 3 miles from its junction with the channel, and is a continuation in nearly a straight line with the last-mentioned portion of it. For the first 2 miles the average breadth of the harbour is $\frac{1}{2}$ of a mile; the western shore rises boldly with deep water close to; the eastern shore although high, has kelp along it, with shoal water. The harbour then contracts to $\frac{1}{4}$ a mile, between two low points forming its head. Beyond these points is a basin, about 2 miles in circumference, filled with rocks and woody islets; the land on its north and west sides is high and mountainous, whilst that on its eastern side is low.

The country around this locality is mountainous, and thickly wooded; but the timber is smaller and less valuable than that in the magnificent forests of Vancouver island. The soil is poor, but there are indications of copper in different places. The sea otter, the fur of which fetches very high prices in China, are numerous.

The Coast.—About 3 miles northward of the eastern entrance to Houston Stewart channel, and at about 2 miles off the coast, is a ledge of rocks, lying a little above water; the sea breaks violently over them, and for a considerable distance around;—other rocks encircle these, but they are under water. From Houston Stewart channel to Cumsheawas harbour on the eastern side of Moresby island, a distance of about 50 miles, the coast is high, and broken into numerous inlets, with many islets along it, probably affording good harbours. Cumsheawas harbour is in about lat. 53°

CUMSHEAWAS HARBOUR trends nearly E.S.E. and W.N.W., and is reported to be both large and safe. A spit, on which the sea breaks heavily, runs off its southern point of entrance nearly two-thirds of the way across to the northern side. The channel in is over a bar with 8 fathoms water on it; this bar connects the end of the spit with the northern shore, inside the north point of entrance, and off which lies a small island.

SKIDEGATE HARBOUR and CHANNEL.—About 20 miles north-westward of Cumsheawas harbour is the entrance to Skidegate harbour and channel. The intermediate coast is lower and more level than that to the southward, with an extensive bank along it for some miles before coming to Skidegate, the depth being as little as 7 fathoms, at 3 to 4 miles off shore.

Skidegate harbour is very spacious, and communicates with the Pacific at Cartwright sound, near Buck point; the channel, however, is intricate, and only navigable for canoes a portion of the way through. The southern point of the eastern entrance is low and woody, and a spit, with only from 1 to 2 fathoms on it at low water, extends in a N.W. direction for about 4 miles, to within 1 mile of Dead Tree point, which is the northern point of entrance, and receives its name from the number of dead trees upon it. A rock, just awash at low water springs, lies near the outer extreme of the spit, about 1 mile from this point, but the available passage between is not more than $\frac{1}{2}$ a mile wide, as the spit extends beyond the rock, and the shore near the point is not bold.

Directions.—When bound into Skidegate harbour, first get well to the northward of its entrance, and run along the shore keeping about $\frac{1}{4}$ a mile distant from it; about 7 to 8 fathoms water, and paying strict attention to the soundings, until Dead Tree point bears W.N.W., when the water will

deepen to 15 fathoms; then steer more to the eastward, and the water will shoal again, and if the weather is clear, a remarkable promontory (looking like an island) will be seen at the head of the harbour, also the two village islands, unless it be very thick, can always be recognised.

Keep the promontory just touching the eastern side of the village islands (when in one), bearing South, and it will lead in over the bar in 5 fathoms; after passing the bar, the water will deepen to 15 or 16 fathoms, and the village islands can be passed on either side. If the inside passage (which is about $\frac{1}{2}$ of a mile wide) is used, keep in mid-channel, and follow the shore for about 2 miles, round two small points to the anchorage, which is in a capacious and pleasant looking bay, in 13 fathoms water, over muddy bottom, at $\frac{1}{2}$ of a mile from the beach; the surrounding land is moderately high and thickly wooded.

The village of Skidegate is situated in the bay, off which are the village islands, and consists of many houses fronting the beach, all of which are dirty and smell strongly of fish. The Indians are a finer race than the Vancouver islanders, and although very dirty, are much cleaner in their personal appearance. A space of ground near the village is cleared of brushwood for potatoes, which thrive exceedingly well. Plenty of wood and water can be obtained, and the natives will gladly assist if paid with tobacco, &c. for their labour. Some distance from the anchorage, and on the side of a mountain, are large quantities of coal, of a description very similar to that discovered at Nanaimo in Vancouver island; it is however in too inconvenient a position to be worked.

The Coast.—The coast between Skidegate and Rose point, the north-east extreme of Graham island, being rather low, with dangerous flats running off it, should be given a berth of at least 6 or 7 miles, and the lead kept constantly going whilst running along it; the soundings were from 9 to 11 fathoms. Cape Ball, nearly 20 miles from Skidegate bar, is very conspicuous, having a remarkable white cliff on it, with lower cliffs on either side; it cannot be mistaken, for there is no land like it between Skidegate and Rose point. Captain McNeil, of the Hudson Bay Company's service, found a rock with only 2 fathoms on it lying East about 6 miles from Cape Ball.

Rose point is low, and has a dangerous spit running off it in a N.E. direction for nearly 5 miles. With the point bearing W.S.W. about 6 miles, a round shaped hill, named Macroon, will open out clear of the land off which this spit runs; the hill is about 300 or 400 feet high, but shows out so distinctly as to look almost an island. This part of Dixon channel, between the land near Rose spit and Stephens island on the continental side, is about 20 miles wide, with soundings quite across. When the centre of Zayaz island bore N. by W. $\frac{1}{2}$ W., and the north extreme of Stephens island E. by N. $\frac{1}{4}$ N., which is about half way between Rose spit and Brown passage, the depth was 15 fathoms.

The bank of soundings between Rose point and Stephens island was found very useful on one occasion, during a strong breeze from the S.E., with thick weather, when the *Virago* anchored on it and remained until it cleared up, and the land became visible.

The coast from Rose point to Virago sound is low, and thickly wooded for some miles from the shore, which has a bank running off it, and should be approached with caution, with the lead constantly going. At 8 miles N.N.E. $\frac{1}{2}$ E. from the east point of Virago sound, the depth was 52 fathoms

over sand (there are soundings outside this for several miles); at 5 miles off, the soundings were about the same; at 2 miles there were 28 fathoms, sand, and the water then gradually shoaled in to the shore. From Virago sound to North island, the coast is tolerably bold, excepting in one or two places, where there are some rocks, but they do not extend far off, and are above water.

MASSET HARBOUR.—Rather more than 20 miles S.W. $\frac{1}{2}$ S. from Rose point is Masset harbour, the entrance to which is formed between a low point, with a ledge of rocks $\frac{1}{2}$ a mile off it covered with kelp, on the western side, and the point of a long spit partly dry (the surf usually breaking the whole length of it), on the eastern, the passage between having an extensive bar. With the outer western point bearing W. by N., 1 mile, the depth is 5 fathoms at low water; from this position the course in is about S. by E. $\frac{1}{2}$ E., the soundings over the bar varying from 5 to 8 fathoms, for about 8 miles, to abreast a village on the western shore, a little more than a mile from what may be termed the inner or proper entrance to the harbour; the water then suddenly deepens to 9 and 11 fathoms, the channel lying in the direction of the eastern point of what has been called the inner entrance, and the depth, at about 2 cables lengths from the beach that forms it, being from 10 to 13 fathoms. Just inside, and round this point, is a pretty bay, with a beach, containing the principal village, off the centre of which there is anchorage in 10 fathoms. The ebb tide runs very strong, making this by no means a good anchorage.

At this part the width of the harbour is nearly 2 miles, a large sand bank filling up its western side. The natives describe the harbour as running in a southerly direction for many miles, and widening out considerably, with deep water, and that several years ago, ships (some having three masts) used to anchor in it. Edensaw, the chief of the neighbouring tribe, and who is a very intelligent and (when it suits him) valuable person to a stranger navigating this coast, says, that when the Indians wish to go to Skidegate, they pass on to the head of the harbour in their canoes, and walk across a mountainous neck of land, from the summit of which both harbours can be seen, the distance between them being inconsiderable.

In 1852 the Indians belonging to this place seized, plundered, and burnt an American schooner, the master and crew being spared through the influence of the chief, Edensaw; this should place any one who may happen to visit these people on their guard.

VIRAGO SOUND.—Between Masset harbour and Virago sound, which lies about 10 miles to the westward, there is good anchorage in some places, in which a vessel might remain a night instead of keeping under-way, or cruising about with a S.E. wind, and thick weather.

The outer anchorage of Virago sound is sheltered from all winds to the southward of East and West. With two small wooded islets on the west side of the entrance, bearing W. $\frac{1}{2}$ S. 1 mile, the east point N.E. $\frac{3}{4}$ E. 2 miles, and the opening to the inner harbour South about 2 miles, the depth is 7 fathoms water, over sand and shells; the shores are low and fringed with kelp, but the lead will be a safe guide, as the water shoals gradually towards the land.

The inner harbour of Virago sound (the native name of which is Naden,) is capacious, and sheltered from every wind. For about 1 mile outside the entrance there are several banks, formed probably by the sand, &c., washed

down by the ebb stream, which runs with considerable strength. The rise and fall of the tide is about 13 feet. The narrowest part of the entrance is about $\frac{1}{2}$ a mile wide, with a deep water channel, which for the first 2 miles is intricate and should not be attempted until properly sounded. The western side of one part of the channel, which may be called the narrows, is completely blocked up by rocks, which show towards low water; within these the channel is much clearer, and runs up in a southerly direction for 2 miles further, and then widens out into an extensive and magnificent harbour, several miles in circumference, having, according to Edensaw's report, sufficient water for any vessel. Two streams, navigable for boats, empty themselves at the head of the harbour, and some smaller ones exist in other parts of it.

The village is to be built inside a point on the western side the narrowest part of entrance. Some ground near it is cleared for potatoes, which are much used by the natives, and form one of their principal articles of food.

PARRY PASSAGE, named after the late Sir E. Parry, separates North island (which forms the north-western extremity of the Queen Charlotte islands,) from Graham island. Rocky ledges run off its southern side for about a mile, but there is a good and clear channel between them and North island. The tidal streams rush through the passage, and form a perfect race. On the south side is Edensaw's village, from which he intends removing to Virago sound.

Just without the eastern entrance of Parry passage, and on the south side, is a bay with anchorage in it. A line of kelp fringes the shore, which is studded with rocky patches and stones. This is not a good anchorage, as the flood sets into it from the passage, forming a number of eddies, and rendering it almost impossible to lie at single anchor without fouling it. The country at the back is low and covered with trees, with here and there grassy spots.

On the south side of North island, in Parry passage, is a snug cove named Henslung, in which whalers occasionally anchor. The *Virago* anchored in it in 80 fathoms water, and had but just room to swing clear of the precipitous rocks which form its western side. At the head of the cove is a sandy beach, with a stream of water running through it. The whole island is thickly wooded.

On the eastern side of North island there is said to be a good anchorage in a bay which was formerly often used by the vessels belonging to the old North West company.

Directions.—When leaving the western entrance to Parry passage, get a good offing before hauling to the southward, as a rocky ledge runs off cape Knox for about 3 miles in a westerly direction, the sea breaking with great violence on several parts of it. When well out, Frederick point will show like a low projecting point of an island, (which it is,) about 18 miles to the southward. At 2 or 3 miles southward of Parry passage is an indentation of the shore, which might be taken as its entrance by a vessel coming from southward,—a mistake that might lead to serious consequences, as the whole coast, as far as Frederick point, appears to contain several open bays, with outlying rocks off each of them. The Indians, in their sketches of this part of the coast, do not draw any harbours, but merely exposed bays.

HIPPA ISLAND, lying 25 miles southward of Frederick point, is high and bold to seaward. This portion of the coast is higher and more broken than the former, the openings appearing deeper, neither does it seem to have so many rocks lying off it. The Indians show some good harbours towards

Hippa. When abreast Hippa island, Buck point, 80 miles distant, and also cape Henry, 10 or 12 miles farther to the southward, can be seen, the coast presenting the same high and broken appearance as the preceding 25 miles. All the points along this part much resemble Buck point, which is rather low and rugged, jutting out from the high land at the back.

BUCK POINT is on the southern side of Skidegate channel, which leads through to Skidegate. It has a large high island just northward of it, and there is another, much smaller and peaked, standing out clear of the land, at about 3 or 4 miles farther northward, and lying in the entrance of Cartwright sound, which is formed between Buck point on the south, and Hunter point on the north. Just southward of Buck point, in Englefield bay, is an opening, probably leading into a harbour.

INSKIP CHANNEL.—Englefield bay has Buck point on the north, and cape Henry on the south, with Kuper or Kennedy island in its southern part. This island has a channel on either side leading into Mitchell harbour, known also as Gold harbour. The northern, or Inskip channel, which leads round the north side of Kuper island, was first used by the *Virago* in 1858, its entrance being a few miles south of Buck point. It is about $8\frac{1}{2}$ miles long, and $\frac{1}{2}$ a mile wide. A little without it, there are some small islands on either side, but there will be no difficulty in discovering the passage in. In the channel there was no bottom at 60 fathoms, but at the entrance a cast of 85 fathoms was obtained on a halibut bank. At a short distance inside the islands, on the port side of the entrance, is a village belonging to the Killkite tribe. Farther in, on the same side, and about $8\frac{1}{2}$ miles up, is a deep opening, and where this and Moore channel meet are two other openings to harbours, with some small islands lying near them. This channel is no doubt equally as safe as the other.

MOORE CHANNEL, on the south side of Kuper island, is named after Mr. Moore, late Master of H.M.S. *Thetis*. This officer made a survey of both it and Mitchell harbour whilst in that ship, which was sent to protect British interests in 1852, during the time that a large number of adventurers from California had collected here to dig and search for gold, some of that metal having been discovered by the Indians. This channel is 5 miles long in an E.N.E. and W.S.W. direction, and $\frac{1}{2}$ a mile wide, the shore on each side being bold of approach, high, and covered with trees nearly down to the water's edge. In mid-channel there is no bottom at 70 fathoms. On the north side, just without the entrance, are some small rocky islets, named Moresby islands, and on the south side a few rocks close in shore.

Mitchell, or Gold Harbour, about $2\frac{1}{2}$ miles deep and $\frac{1}{2}$ a mile wide, is surrounded by precipitous and densely wooded hills, from 700 to 800 feet in height, and at its head in Thetis cove is a sandy beach and a stream of water. At $1\frac{1}{2}$ miles up the harbour is Sansum island, a small spot covered with trees, and the ruins of a number of huts. The anchorage lies inside this, in Thetis cove, keeping Sansum island on the port hand; the passage being a cable wide, with deep water. This cove is completely land-locked, but squalls, frequently accompanied by rain, come over the hills with considerable violence. At a good half mile from the mouth of the harbour, on the starboard side going in, is the Thorn rock, with only 3 feet on it at low water: it lies about a cable's length from the shore, and on the opposite side, not quite at so great a distance from the land, but a little further out, is another rock. These are

dangerous to vessels working in or out; but there is nothing to fear if the wind be fair, and the ship kept mid-channel.

Douglas Harbour.—At 1 mile to the westward of Mitchell harbour, and on the same side of Moore channel, is the entrance to Douglas harbour, apparently very similar to the former, from which it is separated by Josling peninsula.

Directions.—The land being very high on both sides of the channels leading into the above harbours, influences the direction of the wind, which is either right in or out. Winds with any westing blow in, and those with easting the contrary. A sailing vessel leaving Moore channel with a S.E. wind should keep well over towards Hewlett bay, to enable her to fetch clear of the Moresby islands, as the wind will be very unsteady until well clear of the high land to windward.

TASSO HARBOUR.—Cape Henry lies 3 miles southward from the entrance to Moore channel, and terminates in a steep slope with a hummock at the extremity; 18 miles southward of this is the entrance to Tasso harbour, the intermediate coast being high, and rising abruptly from the sea. The entrance is short and narrow, but the harbour itself is extensive, with deep water in many places; the anchorage in it is near some small islands on the port hand going in; it has only been visited by a few of the Hudson Bay Co's. officers.

The Coast.—Between Tasso harbour and cape St. James are other openings, which, according to Indian report, lead into good harbours, the southernmost of which is that leading into Houston Stewart channel and Rose harbour. Inside Anthony island, and close to Houston Stewart channel, is an opening, called by the natives Louscoone, and reported to be a good harbour, not unlike Rose harbour. This coast is also apparently very bold, excepting off Anthony island, and like the previous 18 miles. The land near cape St. James has fewer trees on it than that to the northward.

Winds.—S.E. winds are prevalent, and are almost invariably accompanied with thick rain; those from the opposite quarter generally bring fine weather. The weather is very uncertain, and cannot be depended on for 24 hours at a time.

Tides.—The following brief account of the tides along the north and north-east coasts of the Queen Charlotte islands is given by a Hudson Bay Company's officer.

The course and rate of the tide streams are not regular, being greatly influenced by the winds. At full and change they run with great strength. Time of high water, about 12h. 30m.

The flood, coming from the westward round North island, sets along the Masset shore for Brown passage, spreading about 15 miles round Rose point, towards Cape Ibbotson, where it meets the flood from the southward, from Skidegate, Banks island, and the Principe channel; consequently between Rose point, Cape Ball, Cape Ibbotson, and thence S.E. 4 or 5 leagues, the tides are very irregular.

The tides between Cape Murray, Percy point, and Zayas island are the strongest and most irregular, causing a heavy and confused sea, so much so, that in bad weather it has the appearance of breakers.

Geographical Positions.—The geographical positions of the principal points and headlands of the islands as given in all charts of present existing, should be considered as only approximate to the truth. There has not as yet

been even a running survey of the group. The following determinations are from observations made by an officer in the Hudson Bay Co. service.

Cape St. James	lat. 51	57 long.	180	52
Cumshewas island (north-east point) ...	58	1	181	22
Skidegate harbour	58	17	181	51
" " Bar rock	58	22	181	99
Cape Ball	58	42	181	96
Rose spit point	54	18	131	22
" " point of reef	54	15	181	11
North island (north point)	54	21	183	0
Devil's ridge	54	40	181	23

Rose spit to Masset harbour S.W. $\frac{1}{2}$ S. 20 miles.

" to Cumshewas S.S.E. 70 miles.

" to Skidegate S. by E. $\frac{1}{2}$ E. 50 miles.

ISLANDS AND ROCKS OFF THE COASTS OF CENTRAL AMERICA AND CALIFORNIA.

COCOS ISLAND.—This island is about 4 miles in extent, and its northern part, Chatham bay, lies in lat. $5^{\circ} 32' 57''$, long. $86^{\circ} 58' 22''$, according to the determination of Sir Edward Belcher in 1888. It is of considerable height, particularly the western part, and when viewed from a distance of 18 or 20 miles, on a bearing of N. 78° E. to N. 81° E., its south-west extremity appears to rise abruptly from the sea, in steep rugged cliffs, to a considerable height, and then in a more moderate ascent to its most elevated part, which is a hill of no great size, whence it descends more uniformly to its northern extremity, which appears like a detached islet. When viewed from the northward, opposite the bays, the shores appear to be composed of broken, perpendicular, rocky precipices, beyond which the surface rises unevenly to the summit of the island, the whole covered with a thicket of small trees near the shore,—but on the more elevated land in the interior, with large spreading trees. This island can be seen more than 20 leagues off; but of its interior little is known, except that it is rocky and mountainous, and probably contains a large lake or sheet of water, such having been seen by some of the party under Sir E. Belcher. Its shores have only partially been examined, and principally at the northern part of the island, where there are two bays containing moderately good anchorage. Off the coasts are several detached islets and rocks, which extend some distance, and particularly from the S.W. part of the island, where they run off fully 2 miles, and would be dangerous, if it were not that they are sufficiently high to be seen and avoided. The lower parts of these detached islets consist of a belt of white barren rock to the water's edge, and their tops are generally covered with trees. The coasts of the island are generally steep perpendicular cliffs, against which the sea breaks with so much violence as to preclude an attempt to land in any part except in the bays on its northern side. In many parts of these cliffs are falls

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of excellent water, a supply of which, it is said, can easily be procured, as well as cocoa nuts, and plenty of wood for fuel.*

Captain Colnett, who visited the island in 1793, says :—"The western side of the island is the highest, and presents itself in the form of a round hill. The eastern side appears to be much broken, the land sloping in most parts abruptly to the sea, but in others presenting bold and perpendicular cliffs. The island does not appear to possess a spot where trees can grow that is not covered with them or some kind of bushy plant, which, when blended with the barrenness of intervening rocks, produces a picturesque effect ; while the streams pouring down from their various fountains to the sea greatly heighten the beauty of the scene. It is Tahiti on a small scale, but without the advantage of its climate, or the hospitality of its inhabitants."

Vancouver appears not to have had so favourable an impression of the island, as Captain Colnett. "This island cannot be considered as having a pleasant appearance in any one point of view, for although its inland surface is much diversified by hills and valleys, yet the only low land of any extent that we were certain it possesses is in the bottoms of the two bays, each of which forms the extremity of one of these valleys, bounded by craggy precipices, from the foot of which extends a narrow strip of low flat land that terminates in a beach at the water side, resembling more the dreary prospect exhibited at the heads of the several branches of the sea we had so recently explored on the coast of North West America, than anything else I could compare them to.

Every other part of the shore seemed to be composed of steep, broken precipices of rock, of which substance the interior of the island was apparently composed, as the naked cliffs were frequently seen protruding their barren sides through the thicket, which otherwise covered the surface of the island. This thicket, so far as we were able to ascertain, was chiefly composed of a great variety of trees of a moderate size, with an impenetrable underwood of the vine or supplejack kind, which opposed any excursion into the country ; some attempts were, I believe, made to penetrate there by the water course, but this, from rocky precipices and other obstructions, was found to be equally impracticable ; our knowledge of its productions must consequently be confined to our observations on the small margin between the woods and the sea shore, the only part that was accessible to us."

The primary advantage of Cocos island is the abundant supply of water which it affords. This abounds in every part, and is to be easily procured at the stations to which vessels can resort. From its purity and limpid appearance, and from its being destitute of any colour or unpleasant taste, either from dead leaves or other decayed matter, Vancouver was led to infer, although heavy rains had fallen during his stay in January, 1795, that the larger streams of water have a more remote and permanent source than accidental showers. The soil in the immediate vicinity of the streams falling into the bays is of a poor, loose, sandy nature ; but at a little distance behind the beach, and in the fissures of the rocks, there is a rich black mould, apparently of great fertility, and this is probably the case in other parts of the island. All the vegetable productions of the island grow luxuriantly. On the rocky cliffs near the sea, where the uneven surface will permit anything to grow, there is a coarse kind of grass which affords an excellent retreat for the sea-fowl, and also a par-

* This is according to Vancouver ; but it has since been stated that all the trees have been cut down.

tiular kind of tree, something like the cloth plant of the South Sea islands, but much larger. Some of these trees grow to the height of 80 feet, and have a brightish coloured bark, free from branches to the top, where the leaves fall over, giving the trees the appearance of umbrellas. Besides these trees there are others in the interior, occasionally of a considerable size.

Chatham Bay.—The north-easternmost anchorage of the island is named Chatham bay, from the armed tender accompanying Vancouver. It is not very large, and off its east and west points are two islets, the western and larger named Nuez, and the eastern Conic; these afford protection from the sea, especially the western islet. The width of the bay from point to point of the islets is about a mile, in a direction of S. 52° E., and N. 52° W.: and from this line of direction its extent to the bottom of the bay is also about a mile. The soundings are regular, of from 12 to 50 fathoms, and vessels may ride very snugly within less than $\frac{1}{2}$ a mile of the beach, in about 20 fathoms water, but in a less depth the bottom does not appear to be so free from rocks. Here Vancouver anchored, in January 1794, in 33 fathoms, on a sandy and gravelly bottom, apparently good holding ground and free from rocks. The east point of the bay, which is a small conical islet lying close to the north-east extremity of the island, bore S. 51° E.. $\frac{1}{2}$ a mile; the west point of the bay S. 75° W.; a steep rocky islet lying off it, from S. 87° W. to N. 66° W.; and the watering place at the mouth of a very fine stream, emptying itself over a sandy beach S. 18° W., about $\frac{1}{2}$ of a mile. Within this the *Chatham* also anchored, in 26 fathoms, similar bottom.

Sir Edward Belcher says, that in Chatham bay a vessel may anchor in 6 fathoms, within a $\frac{1}{2}$ of a mile of the beach, but the best anchorage is in 12 fathoms. There a constant draught will be experienced between the openings of the islets, and a vessel can generally enjoy the refreshing sea-breezes, and fetch out at once, clear of the dangers, which are but few.

From the depth of 20 fathoms, the soundings outside of Chatham bay soon deepen to 40 and 50 fathoms, the latter at only $1\frac{1}{2}$ miles from the shore. Both this and Wafer bay afford good protection from the winds prevailing during the early months of the year; and from the abundance of the vegetation growing close to high water mark, it would seem that neither of them are subject to violent storms, or heavy seas.

Wafer Bay.—At about a mile westward of Chatham bay is Wafer bay, which is more extensive and exposed than it, and its soundings are neither so regular, nor is the bottom so good. Into this bay a large stream of fresh water flows, and the sea breaks heavily. Captain Colnett appears to have preferred this bay to Chatham bay; he says:—"It may be easily known by a small rugged barren rock, about the size of a large boat, bearing West, of the body of the bay about 5 or 6 miles. It lies East and West, and its greatest depth is not 2 miles, nor is it one in breadth; but I would not venture into it in a vessel of more than 200 tons. Its anchorage is in from 7 to 50 fathoms, and is nearly sheltered from all winds. This bay is also preferable to that at the north point, because the shore of the first is steep; while that of the latter consists of a beautiful valley and sandy beach, where cocoa trees appear in greater numbers than I have seen in any other place. There is also a rivulet of water 18 or 20 feet in breadth, which is supplied from a basin a mile inland, in which our crew, to avoid the sharks, went and bathed. Although this bay is so small, it is very convenient, and as secure as the anchoring places generally are which are not entirely sheltered. Its principal inconvenience arises from the constant rains as out of the four days

we were beating off it, it rained during three of them, and sometimes with heavy storms of lightning and thunder. Those on shore experienced an equal amount of wet weather; and so thick was the rain, that, for eight hours together, we were not able to see twice the length of the ship; but this may not be the case at all seasons."

Of Wafer bay it may be said that one of its principal inconveniences is the heavy rollers, particularly at low water, at which time the flat extends out a considerable distance. It is also more subject to calms than Chatham bay, and consequently not so easy of ingress and egress; and being exposed to westerly winds, watering at all times is difficult, and at low tide quite impracticable.

The climate at Cocos was considered by Vancouver to be temperate and salubrious. The thermometer, in January 1795, was usually between 78° and 80°, yet the heat was not so oppressive as was experienced further to the northward, and no inconvenience was experienced from the heavy rains.

The rise and fall of the tides by the shore are very considerable and regular, twice in the 24 hours, without any apparent stream, and are not influenced by currents. The night tides appear to be the highest, and probably rise 10 feet perpendicularly; but at the time of the observations, the surf was too high to permit a very correct measurement. The time of high water is about 2h. 10m. after the moon passes the meridian.

Cocos island appears to be well provided with sea-fowls: pigs, also, were left there by Captain Colnett, which appear to have increased and multiplied considerably. Fish are abundant, but difficult to catch; eels are large and numerous, as also are the turtles, but they appear shy of coming to the land. It is said that there are a large number of rats of the white and brown kinds on the island, also land crabs of a prodigious size, and that goats are in the interior, but keep to the heights.

MALPELO ISLAND.—The actual geographical position of this island has not been ascertained, but approximately it is lat. 4° 0', and long. 81° 32'. It is a high, barren, and perpendicular rock, visible about 20 leagues. A small quantity of green moss, and a few dwarf bushes grow in its cracks or gullies, and are the only signs of vegetation it possesses. It is surrounded with islets, and the whole may extend about 9 or 10 miles in a north and south direction. The centre of the island bears a resemblance from several points of view to the crown of a head; and its being barren accounts naturally enough for the name Malpelo, which the Spaniards have bestowed on it, which signifies *bald head*.

In the vicinity of this island the currents are strong, and have much the appearance of breakers; the set appears probably to be to the N.E. by E., at the rate of 2½ miles an hour.

CLIPPERTON ROCK.—This rock is in lat. 10° 17', long. 109° 10', it is sufficiently lofty to be seen from a distance of 12 or 15 miles. When first in sight it appears not unlike a sail, but on a nearer approach it presents the appearance of an immense castle. The colour is very dark, in fact nearly black. This most dangerous rock and shoal is but little known, and thought by many not to exist. Its vicinity is generally indicated by the presence of numerous sea-birds—the white gannet, wide awake, and booby, which are often found as much as 50 or 60 miles from the rock.

The above position of Clipperton rock is from the determination of Sir Edward Belcher, but it has recently been stated that its more correct position

is lat. $10^{\circ} 18' 24''$, long. $109^{\circ} 7' 30''$. The island is between 7 and 8 miles long, and is almost an even height from one end to the other, being only 6 or 8 feet above the sea-level. The rock in its highest point is about 150 or 170 feet; and the width of the island is about 1700 or 1800 yards. The island is composed of the whitest sand, and the only appearance of vegetation is one continuous fine brown line, supposed to be of grass or rushes. The rock is conical, unequal, and jagged, and at the northern end has a circular hole right through, about 50 feet from the top. The sea breaks over the whole extent of the island to windward, and at the north-east and south-west ends, at different distances from the sand-bank. It has been observed that, "as the calms are sudden in these latitudes, and the winds variable (Clipperton being on the edge of the south-east trade-wind), if a ship is anxious to sight the rock, she should pass to the eastward of it, as the western side is evidently the windward side; if it becomes calm when they are in the neighbourhood, there is less danger when they are to leeward, and the swell will throw them off. Clipperton is the most naked, solitary danger that imagination can picture. The sand bank seems ill able to support the weight of the huge rock, and the rock itself appears to be sinking from its treacherous foundation. The sight of this tremendous and distressing danger, and the reflection it calls up of the awful calamities it has been the cause of, reminds one of the sublime truth of M. de Lamartine's remark, when he was surveying some of the ruins of the hill of Baalbec, that 'Silence is the only language of man, when what he feels outstrips the ordinary measure of his impressions.' There is an association with the ruins in the midst of a desert, and this solitary rock standing in the midst of the pathless ocean."

In May, 1839, Clipperton rock was visited by Sir Edward Belcher, and after mentioning that for a distance of about 15 miles, it presented the appearance of a brig close hauled, owing to the sun's rays playing on its nearest face, he proceeds to say: "The name, Clipperton rock, certainly misled us, and had we made the point at night, with a fair wind, would, almost *inevitably*, have severely damaged or destroyed both vessels. I certainly should have steered to pass it to the northward; merely assuming it to be a solitary rock."

Nothing in this name would lead a seaman to imagine a high rock, placed on the southern edge of a coral lagoon island, three miles long north and south, by the same east and west.

Its description should stand thus:—A very dangerous low lagoon island, destitute of trees, with a high rock on its southern edge, which may be mistaken for a sail.

This rock can be seen 15 miles. In thick weather the low coral belt, which appears like sand, will not be distinguished until close to it. The breakers on the eastern side of it do not afford sufficient warning for a vessel to trim or change course. On the northern part of the belt, the land is a little raised, and appears to be clad with something like grass.

There are two entrances, which at high water may be safe; but at the moment we passed, the surf was too heavy, and the reflux showed the rocks bare. The dangers from the rock, northerly, extend two miles easterly, and the same north-westerly. On the beach several large trees were observed, and an object which was thought to be part of a vessel, near the western opening.

In the centre of the lagoon, as viewed from the mast-head, there is one large hole of blue water, and a second belt is connected with rock, attaching it

to the eastern side of the island. This literally constitutes two islands, formed by its two openings; both are on the *weather* side of the island.

No living trees were seen, but the whole island was covered with gannett, booby, frigate, pelicans, and several kinds of tern, which had also been noticed in great numbers during the previous week, at least 500 miles to the eastward. From this, an easterly current may be inferred, as these birds generally keep in its stream or tail course.*

No bottom was obtained by the *Sulphur*, with 100 fathoms of line, but the *Starling* had soundings with less than 100, on the northern side of the island.

Sharks, porpoises, and turtle were observed together. The former annoyed us much by biting at our patent logs, for which one was taken, and made an example of. They were very large, and literally swarmed. In all probability, they were attracted by a shoal of file (balistes) and other small fish which had been feeding off our copper since quitting the island of Cocos."

REVILLAGIGEDO ISLANDS.—This is a group of islands in lat. 18° 48', the largest of which, Socorro, is stated to be nearly 80 miles in extent. They are evidently of volcanic origin, and are said to supply neither wood nor water. The name Revella Ggeda, or Revillagigedo as the islands are more generally called, was given by Colnett in 1793, in compliment to the Viceroy of Mexico, from whom he had received much kindness and civility.

Socorro.—This island is lofty, making in several peaks, the highest of which is probably 2000 feet above the sea level. Its northern and western shores have, as yet, only partially been examined, the principal anchoring-places being on the south-eastern coast, which is represented to have a dreary and forbidding aspect. The general direction of the island is W.N.W. and E.S.E., and its average breadth is about 3 leagues. It may be said to consist of one mountain, which can be seen at the distance of about 20 leagues in clear weather, falling in a gradual descent on the south side. It is in a great measure covered with brush-wood, intermixed with the low prickly pear-trees, and occasionally shaded with other trees of a larger growth. Some few patches of the soil are black and barren, as if fire had lately issued near it; and the top of the high land has the appearance, from a distance, of being an extinct volcano; the surface is of a whitish colour, like that of pumice-stone. Although Socorro has not recently given evidence of volcanic action, there is little doubt that the whole of this group of islets originated from that source.

Off the north and west coast of Socorro there are some detached rocks; and some rocks extend also off the south shore, which is a high bold coast. On this side of the island are two bays, Cornwallis† and Braithwaite, in which there is moderately good anchorage, under shelter of the land. Captain Colnett says:—"The seasons of the year being considered, I think the safest anchorage, from June to December, is between the south-west points, opposite to two white coral beaches, which are the first two in succession from the south point of the island towards the west. It is the place where we first anchored, and remarkable from the pinnacle rocks which lay close off the west

* It does not therefore follow, as a matter of course, as noticed by some writers, that the appearance of birds denotes land to windward; they are more likely guided by tide.

† In this bay there are soundings of 80 to 20 fathoms, sandy bottom. Colnett anchored here in 1793, in 25 fathoms, at about two miles from the shore, with the extremes of the island bearing from W.N.W. to E.S.E.; and two small sandy beaches N. by E. to N.N.E.

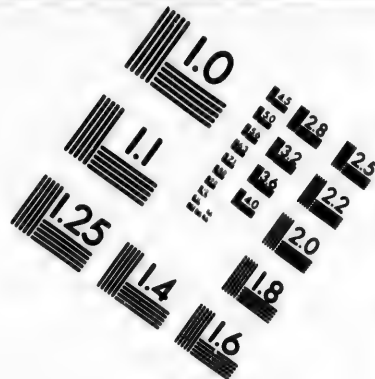
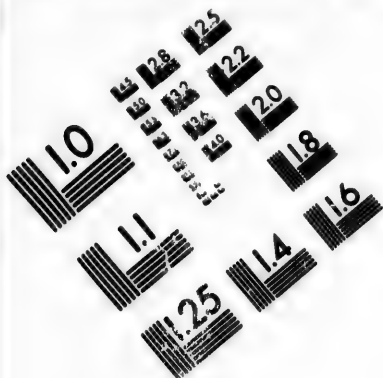
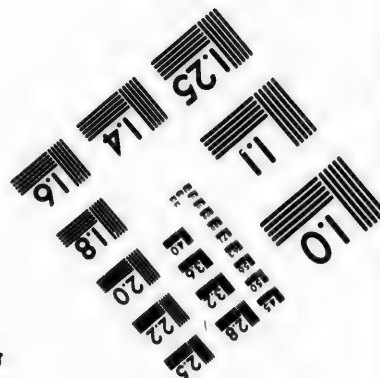
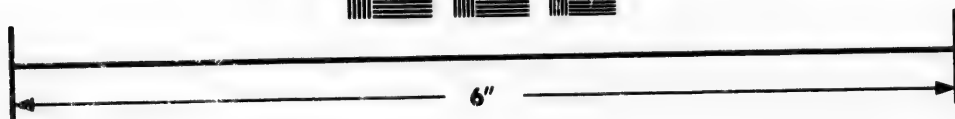
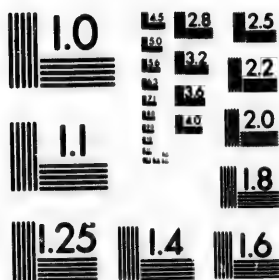


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point of the bay. I prefer this place in the bad season, as the wind seldom blows more than two points to the southward of East. In the good season, however, that is from the latter end of December to the beginning of June, I prefer the south-east bay, being better anchorage and nearer to the cove, which was the only good landing-place we discovered, and is easily known, being a stony beach at the first inlet in the shore to the eastward of the south point:—all other parts of the coast on the south side of the island are iron-bound, which makes it extremely difficult, if not impossible, to land, except in very fine weather."

Braithwaite bay is an open roadstead, exposed to the eastward and southward; in it the soundings are 17 to 10 fathoms, sand and coral. Its position is lat. $18^{\circ} 48' 14''$ and long. $110^{\circ} 54' 15''$, according to Sir Edward Belcher, who observes:—"The landing is rocky, with shores of lava *coulé*, and nothing like a beach. Neither wood nor water was visible, although from the constant clouds which hang over the high peaks, there must be a supply in some other point. Lieut. Wood was despatched to examine the westward bay for wood or water. His report (not having landed) was, 'that goats were observed, the bay spacious, but no indications of wood or water visible.' It is probable that the goats find water.

I found it difficult to penetrate into the interior of the island, even for a few hundred feet, owing to the prevalence of the *cactus opuntia*; all who attempted to do so suffered for their curiosity. One of my boat's crew made himself ill by eating a large bean which grew abundantly; but as I partook of them cooked without injury, I suspect him to have indulged too freely." Some of Captain Colnett's people also suffered severely from the same cause.

San Benedicto Island.—This island to the north-eastward of Socorro, is in lat. $19^{\circ} 20'$, long. $110^{\circ} 45'$, and when viewed from southward, has a barren appearance, with little or no vegetation. It is about 6 miles long, in a N.E. and S.E. direction, and 2 or 3 in breadth, and has a few rocks, just above the water, off several parts of it. Its surface is uneven, and its aspect is described as romantic, it having the appearance of two distinct islets, when seen from a distance of 9 or 10 miles. On its western side is a small bay, which has not been examined.

Roca Partida.—This is a dangerous barren rock, 50 or 60 fathoms long, in a N.N.W. and S.S.E. direction, lying in lat. $19^{\circ} 9'$, long. $112^{\circ} 2'$. Its breadth is only 25 or 30 fathoms, and both ends are 100 or 120 feet in height, the north-west end appearing forked, and the south-east end like a ragged hay-cock. The two heights are separated by a ragged saddle, which rises 18 or 20 feet above the surface of the sea, and is nearly perpendicular. At a boat's length from the rock there are 85 fathoms; and at $\frac{1}{2}$ a mile off, 50 fathoms; and afterwards no bottom with 100 fathoms of line. The rock appears from every direction like a sail under a jury-mast.

Clarion.—Westward of Socorro and Roca Partida islands is Clarion, a small island of considerable height, and very similar in its natural features to Socorro island. The hills are lofty, the highest peak being estimated to be 1500 feet high, and when bearing to the N.E. they make in three hummocks, which give the island, from a distance, the appearance of three distinct islets. It is probable that it contains but little fresh water, although there must be a great deal precipitated from the clouds, which almost constantly hang over the high land. Neither wood nor other necessaries can be obtained, still a vessel in great distress might have her wants to some extent relieved.

The island is about 5½ miles long, and 2 miles broad, and has been but little examined, particularly the north shore. On its southern side is a small bay named Sulphur, the east side of which is in lat. 18° 20' 36", long. 114° 40' 19"; in this Sir Edward Belcher attempted to moor, but was prevented by the breaking of his anchor. The east end of the island appears to be steep and precipitous.

In the vicinity of Clarion, several islands have been reported, and Sir Edward Belcher sought for them for a considerable time, without success. It may therefore be concluded that as the position of the island was not till lately accurately ascertained, it has been seen by various parties, and reported by each as a distinct discovery.

ALIJOS ROCKS.—This is a very dangerous group of rocks, lying off the coast of California, in lat. 24° 57' 25", long. 115° 45' 20". The southernmost and largest rock is about 110 feet high, and there are many above and under water close to it.

GUADALOUPE.—This island is northward of the Alijos rocks, and its north point is represented to be in lat. 29° 10' 50", long. 118° 18' 30". It is about 15 miles long by 5 miles broad, and is very lofty in the interior, a chain of hills extending through the whole length of the island. The highest of these hills is over 2000 feet high, and one near the north point of the island is estimated to be even 3412 feet in elevation. The island can be seen a distance of about 60 miles, and will appear, when bearing either east or west, lower at its southern extremity than at its northern.

Off the south end of the island are two rocky islets at some distance from the shore, the outermost of which is 500 feet high. The shores are in general bold, but have not been closely examined; although it is said that a small cove exists on the south-east shore, which is formed by some rocky islets, and contains the only anchorage in the island, the riding being in 7 fathoms, and the shelter from all winds except those between S.E. and E.N.E.

But few supplies of any description can be obtained here, the island being quite barren and rocky, and affording very little sustenance for any thing except goats. It is said that wood and water may be obtained from a cove on the north-east side of the island.

Vancouver says that the Spaniards were accustomed to make this island when bound southward from Monterey, or from their other northern settlements; in which route they passed westward and out of sight of the California islands, for the advantage of continuing in the strength of the N.W. winds; they thus reached this island, and afterwards steered a course for cape San Lucas.

TABLE OF POSITIONS &c.*

	Latitude, N.			Longitude, W.			Vari. E.
	°	'	"	°	'	"	
Cape Corrientes, south-west extremity ...	5	28	46	77	52	88	7 85
Alusea point, N. extremity ...	5	86	20	77	29	25	
Port Utria, centre of south islet ...	5	58	80	77	20	20	
Solano point, north extremity ...	6	17	55	77	27	80	
Cupica bay, entrance of Cupica river ...	6	41	19	77	29	86	
Cape Marzo, south-east extremity ...	6	49	45	77	40	0	
Port Pinas, north-east bight ...	7	84	87	78	9	60	
Garachine point, north-east extremity ...	8	6	0	78	21	15	
Patena point, centre of islet ...	8	16	20	78	17	10	
Darien harbour, Graham point ...	8	28	50	78	4	40	
Galera island (Centre of) ...	8	11	20	78	45	45	
San José bank, Trollope rock ...	8	6	40	78	87	40	
Isla del Rey (South end of)—extremity of							
Cocos point ...	8	12	30	78	53	45	7 0
" church of San Miguel ...	8	27	0	78	55	35	
Saboga island, church ...	8	87	10	79	3	10	
Gonzales island, Havannah head ...	8	25	0	79	5	50	
San José island, Iguana point ...	8	18	25	79	6	80	
Brava point, west extremity ...	8	20	36	78	24	80	
Pajaros islands, north-west island ...	8	32	20	78	32	10	
Pelado island (Centre of) ...	8	37	35	78	41	40	
Chepillo island, the tree ...	8	56	32	79	7	0	
Panama, north-east bastion ...	8	56	56	79	31	9	6 55
Flamenco island (North point of) ...	8	54	30	79	30	20	
Bona island, peak ...	8	38	35	79	34	5	
Point Chamé, extremity ...	8	39	0	79	40	50	
Parita bay, Liso point ...	7	58	10	80	20	40	
Iguana island (Centre of) ...	7	37	5	79	50	0	
Cape Mala, extremity ...	7	27	40	79	58	30	
South Fraile (Centre of) ...	7	19	30	80	7	10	
Morro Puercos, south extremity ...	7	18	45	80	25	10	
Point Mariato, extremity ...	7	12	0	80	51	30	7 80
Naranjas island ...	7	15	15	80	55	45	
Cebaco island, west extremity ...	7	29	0	81	18	30	
Gobernador island (Centre of) ...	7	33	0	81	11	0	
Hicarita island, south extremity ...	7	12	45	81	45	30	
Coiba island, extremity of Negada point	7	20	0	81	34	0	

* These geographical positions as far as Coronados islets off port San Diego, California, in lat. 32° 34', are chiefly from the Admiralty charts. The longitudes from the gulf of Panama to port San José in about 90° 44' W., differ so considerably from the determinations of French surveyors, being generally about 12 miles eastward of the latter, that we have also added a table of the results of the French observations, for which see subsequent pages. A mean of the two may perhaps be correct.

TABLE OF POSITIONS &c.

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Lat., W.	Vari. E.		Latitude, N.			Longitude, W.			Var., E.
			°	'	"	°	'	"	
88	7 85	Coiba island, extremity of Hermosa point	7	81	0	81	51	0	7 80
25		Montuosa island	7	28	0	82	18	0	
20		Bahia Honda, extremity of cape Jabali ...	7	42	80	81	80	0	
80		Port Nuevo, Silva de Afuera island...	8	4	50	81	47	0	
86		Secas islands, south-western islet	7	57	0	82	1	80	
0		Viuda rock	8	6	15	82	9	0	
50		Parida island, south-west extremity ...	8	5	50	82	20	40	
15		Ladrones	7	52	0	82	25	0	
10		Ciudad de David	8	27	0	82	26	0	
40		Burrica island	8	1	0	82	54	40	
45		Gulf of Dulce, extremity of cape Matapalo	8	16	0	88	17	10	7 40
40		" Arenitas point	8	82	0	88	16	40	
45		" Golfito point	8	89	80	88	6	80	
40		" Banco point	8	18	0	88	1	80	
45		Sal-si-puedes point, extremity of	8	28	0	88	84	0	
40		Cano island, centre of	8	40	15	88	51	0	
45		Llorena point, extremity	8	84	0	88	42	80	
45	7 0	Mala or Judas point, mount Judas	9	81	0	84	28	80	
85		Gulf of Nicoya, Herradura point	9	88	80	84	87	15	
10		" Calderas bluff	9	53	20	84	89	80	
50		" Sail rock	9	49	10	84	45	80	
80		" Pan de Azucar	9	55	48	84	50	2	
80		" Punta Arenas light	9	58	40	84	46	0	
10		" Blanco island	9	88	0	85	4	0	7 85
40		Morro Hermoso, extremity of	9	55	0	85	86	40	
0		Cape Velas, islet off	10	19	0	85	50	20	
9	6 55	Culebra bay, Gorda point	10	82	0	85	42	40	
20		Cape Elena, extremity of	10	58	10	85	46	80	
5		Salinas bay, Salinas islet... ..	11	8	0	85	89	0	
50		San Juan del Sur, south point of bay ...	11	15	10	85	49	0	
40		Mount Miravelles or Miravaya	10	89	40	85	0	0	
0		Mount Orosi	10	59	0	85	25	0	
80		Mount Madera	11	27	0	85	27	80	
10		Mount Ometepe	11	82	0	85	84	0	
10		Mount Mombacho	11	48	80	85	54	80	
80	7 80	Cape Desolado, extremity	11	58	0	86	86	15	
45		Mount Momotombo	12	25	0	86	27	80	
80		Mount Axusco	12	26	45	86	86	0	
0		Mount Orotu	12	88	0	86	41	0	
80		Mount Telica	12	35	80	86	46	80	
0		Mount Viejo	12	42	0	86	56	80	
0		Realejo, north-west end of Cardon island	12	27	55	87	7	47	
		Gulf of Fonseca, extremity of Coseguina point	12	58	80	87	87	8 0	7 25
		" extremity of Monypeny point	18	8	80	87	80	80	
		" Amapala point, extremity	18	8	40	87	50	15	
		" Chicarene point	18	17	5	87	42	89	
		" La Union	18	20	0	87	47	0	
		Mount San Miguel	18	24	80	88	5	0	

San Diego, California,
from the gulf of
determinations
latter, that we
see subsequent

	Latitude, N.			Longitude, W.			Var., E.
	°	'	"	°	'	"	
Port Jiquilisco	18	10	0	88	16	0	7 80
Libertad, the beach	18	30	0	89	15	30	
Mount San Salvador	18	49	30	89	11	0	
Acajutla, Remedios point	18	34	0	89	43	0	7 80
Istapa, the beach	18	55	0	90	38	0	
San José, the beach... ..	18	50	35	90	44	20	
Mount Agua	14	9	0	90	42	0	
Ventosa bay	16	10	30	95	9	0	
Morro Ayuca, the point	15	51	56	95	43	56	8 10
Guatulco, port	15	44	24	96	8	0	
Sacrificios, the islet	15	44	0	96	19	7	
Acapulco, San Diego fort gate	16	50	56	99	52	15	8 23
Sihuatanejo	17	38	8	101	30	52	
Mangrove bluff	17	54	5	102	12	41	
Lizard point	18	11	0	103	5	0	
Black head	18	36	18	103	41	51	
Mount Colima	19	24	42	103	33	1	
Manzanilla bay, west end of village... ..	19	8	18	104	17	41	
Piedra blanca, islet of	19	6	0	104	27	30	
Navidad bay, cape Graham	19	10	30	104	40	30	
Perula bay, Rivas point	19	34	31	105	6	33	
Cape Corrientes, extreme point of	20	25	0	105	39	21	
Corvetena rook	20	44	0	105	46	30	
Maria islands, south-east island	21	20	0	106	13	0	
„ San Juanito, the north-west island	21	45	0	106	33	0	
San Blas, arsenal	21	32	24	105	15	27	
„ Piedra de Mer	21	34	45	105	27	30	
Isabel island	21	51	15	105	51	45	
Chamatla river	22	50	0	105	58	0	
Mazatlan, south bluff of Creston island	23	11	40	106	22	24	9 30
Piastla river, entrance	24	10	0	107	15	0	10 0
Culiacan (Altata) river, entrance	24	40	0	107	55	0	
Ignacio point, (see page 109)	25	41	0	109	25	0	
Ignacio island, („ „)	25	27	0	109	27	0	
Jiabampa harbour	26	16	0	109	18	0	
Lobos point, extremity	27	17	0	110	39	0	
Guaymas, cape Haro	27	50	30	110	51	40	11 5
„ Almagrito island	27	53	50	110	49	26	
Angeles island, north end	29	35	0?	118	10	0?	
River Colorado, Montague island at entrance	31	40	0?	114	24	0?	
San Marcos island, centre	27	12	0	111	57	0	
Mulege bay, entrance	26	53	0	111	49	0	11 0
Loreto village	26	1	0	111	20	0	
Pulpito anchorage, point	26	30	50	111	25	15	
Mangles anchorage, point	26	16	30	111	22	15	
Carmen island, shore of Salinas bay	25	59	34	111	5	15	10 30
Montserraté island, centre	25	41	0	111	8	0	
Catalina island, north end	25	42	0	110	47	0	

TABLE OF POSITIONS &c.

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, W. Var., E.			Latitude, N.		Longitude, W. Var., E.	
"	"		"	"	"	"
0	7 30	San Josef island, north end of Amortajada bay	24	54 30	110 85 28	
80		Animas rocks	25	6 0	110 27 0	
0		Espirito Santo island, west end of Gallo				
0	7 30	islet (port Ballena)	24	28 0	110 21 0	
0		" south point of San				
20		Gabriel bay	24	25 0	110 19 0	
0		San Juan Nepomezcino, south end of ...	24	16 5	110 16 15	10 0
0		Ceralbo island, south end	24	9 0	109 50 0	
56	8 10	" north end	24	22 0	109 56 0	
0		San Jose del Cabo bay, Salateca village ...	28	8 15	109 87 52	9 85
7		Cape San Lucas, west end of Frayles rocks				
15	8 28	(San Lucas bay)	22	52 14	109 52 8	
52		Magdalena bay, east side of cape Corso ...	24	88 18	112 6 21	9 57
41		Cape San Lazaro	24	48 20	112 16 28	
0		Ballenas bay, Abrejos point	26	48 0	113 86 0	
51		Asuncion island	27	8 0	114 24 0	
1		San Bartolome bay, north-west point ...	27	89 58	114 54 10	11 80
41		Morro Hermoso	27	52 0	115 7 0	
30		Natividad island, east end	27	52 30	115 11 45	
80		Cerros island, north end	28	19 0	115 14 0	
88		San Benito island, westernmost	28	15 30	115 88 15	
21		Playa Maria bay, west point	28	55 87	114 81 20	
30		Geronimo island	29	40 0	115 44 0	
0		San Quentin, west side of entrance ...	30	21 53	115 56 88	
0		Colnett bay	30	59 45	116 16 22	12 0
27		Coronados islets,* highest and largest ...	32	28 46	117 18 21	
80		San Diego, U.S. boundary obelisk ...	32	81 59	117 6 11	
45		" lighthouse on point Loma ...	32	40 15	117 18 30	12 45
0		San Clemente, north-west extremity of the				
0		island	38	2 0	118 84 0	
24	9 30	Cortez shoal, the Bishop rock	32	25 45	119 5 0	
0	10 0	San Nicolas, south-east end of the island	38	14 12	119 25 0	
0		Santa Catalina, the great transverse break				
0		of the island, (north side)	38	26 85	118 28 45	
0		Santa Barbara island	38	30 0	119 2 0	
0		San Pedro bay, edge of bluff at the landing	38	48 20	118 16 8	18 44
0		Anacapa, eastern point of the island ...	38	1 0	119 19 0	
40	11 5	Point Hueneme	34	8 0	119 9 0	
26		Prisoner's harbour, north side of the island				
0 0?		of Santa Cruz	34	1 10	119 40 0	
4 0?		Cuyler's harbour	34	8 0	120 20 27	
7 0		Santa Barbara, lighthouse	34	28 85	119 42 5	
0	11 0	" town, at the landing	34	24 25	119 40 18	
0		Point Concepcion, lighthouse	34	26 47	120 27 0	14 8

* The positions from Coronados islets northward to the north point of Lummi island in Haro archipelago, are from the observations of the U.S. coast surveyors.

	Latitude, N.			Longitude, W.			Var., E.	
	°	'	"	°	'	"	°	'
Point Arguello	84	84	0	120	88	0		
San Luis Obispo bay, the small gully west of the creek	85	10	88	120	48	31	14	38
San Simeon bay, near the landing	85	88	24	121	10	22		
Piedras Blancas, outer one	85	89	0	121	15	0		
Point Sur	86	19	0	121	52	0		
Point Pinos, lighthouse	86	87	52	121	55	0	15	6
Santa Cruz harbour, the landing place	86	57	27	122	0	10		
Point Ano Nuevo	87	7	0	122	19	0		
Point San Pedro	87	85	45	122	80	84		
Farrallon, lighthouse	87	41	49	122	59	5		
San Francisco, Point Lobos, S. head of entrance to San Francisco bay	87	46	51	122	29	40		
" Rincon point, N.W. of South park, San Francisco bay	87	47	7	122	22	82		
" Telegraph hill, near the "San Francisco Observatory"	87	47	53	122	28	19		
" Fort point lighthouse	87	48	31	122	27	88		
" Point Bonita lighthouse	87	49	4	122	30	50	15	88
" Alcatraz island light	87	49	27	122	24	19		
Punta de los Reyes, landing in Drake's bay	87	59	85	122	57	86		
" lighthouse site, the western head of the point	87	59	89	123	0	13		
Bodega bay, west end of Sandy point	88	18	20	123	2	17		
Haven's anchorage, the bluff at the landing	88	47	58	123	84	1		
Mendocino bay, the bluff near the landing	39	18	8	123	47	26		
Punta de Arena, N.W. extremity of the point	38	57	0	123	45	0		
Shelter cove, (point Delgado), the bluff near the landing	40	1	14	124	8	8		
Cape Mendocino, extremity of cape	40	25	0	124	22	0		
Humboldt bay, Red bluff	40	44	40	124	10	80		
" lighthouse	40	46	4	124	12	10	17	18
Bucksport, town	40	46	37	124	10	44	17	22
Trinidad, town	41	8	20	124	8	8		
Crescent City, lighthouse	41	44	34	124	11	22		
Port Orford, the bluff W. of the town	42	44	22	124	38	47		
Cape Orford, extremity of the cape	42	50	0	124	80	0	18	45
Cape Arago, lighthouse	43	20	36	124	22	20		
Umpqua, a mile from entrance to the river, (W. side)	43	41	45	124	9	57		
Cape Perpetua, middle part of the headland	44	19	0	124	6	0		
Cape Foulweather, southern part of the cape	44	45	0	124	4	0		
Cape Lookout, point furthest west	45	20	0	124	0	0		
Cape Meares, N.W. part	45	30	0	123	58	0		
Cape Falcon, or False Tillamook, northern part	45	47	0	123	58	0		
Tillamook head	45	58	0	123	59	0		
Astor point, near Astoria, Columbia river	46	11	28	123	49	82		

TABLE OF POSITIONS &c.

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S. W. Var., E.		Latitude, N.			Longitude, W.			Var., E.	
"	'	°	'	"	°	'	"	°	'
0									
81	14 38							21	8
22									
0									
0									
0	15 6								
10									
0									
84								21	47
5								22	8
40									
82								21	56
19									
7 88									
50	15 38								
19									
7 86									
0 18									
2 17									
4 1									
7 26									
5 0									
8 8									
2 0									
0 80									
2 10	17 18								
0 44	17 22								
8 8									
1 22									
8 47									
0 0	18 45							22	16
2 20								22	40
9 57									
6 0									
4 0									
0 0									
8 0									
58 0									
59 0									
19 82									

* These longitudes, from the Admiralty charts, are dependent upon Duntze head, Esquimalt harbour, being 123° 26' 45" W.

	Latitude, N.			Longitude, W.			Var., E.
	°	'	"	°	'	"	"
Point Cox, Vargas cone	49	5	80	125	52	80	
Clayoquot sound, Observatory island in							
Hecate bay	49	15	22	125	56	17	
Refuge cove, village on west side	49	20	50	123	16	40	28 10
Hesquiat harbour, Boat cove	49	27	81	126	25	27	
Estevan point, south extremity	49	22	7	126	32	32	
Nootka sound, Observatory islet in Friendly							
cove	49	35	31	126	37	82	
Nuchatlitz inlet, North-west cone on Fer-							
rer point	49	44	50	126	58	50	
" Colwood islet in port Lang-							
ford	49	47	20	126	57	5	
Esperanza inlet, Observatory rock in Queen							
cove	49	52	45	126	59	55	
" Tat-cha point... ..	49	51	30	127	10	0	
Kyuquot sound, the shingle point at entrance							
of Narrowgut creek	49	59	55	127	9	80	28 80
Barrier islands, Highest island	49	57	45	127	21	80	
Naspart inlet, Sullivan reef	50	4	80	127	41	0	
" beach at its head	50	11	21	127	37	58	
Cape Cook, Salander islet	50	6	31	127	57	20	
Klaskinc inlet, Nob point	50	17	15	127	52	0	
Quatsino inlet, Observatory rock in North							
harbour	50	29	25	128	8	39	
" Observatory islet in Koprino							
harbour	50	30	0	127	52	16	
" Kitten islet in Hecate cove							
... ..	50	32	26	127	36	18	
Cape Meete, summit or cape	50	46	41	128	26	45	
Scott islands, west point of Triangle island							
... ..	50	51	53	129	6	32	28 50
Hope island, north point of Indian island							
in Bull harbour	50	54	47	127	56	8	
Galetas channel, islet in centre of port							
Alexander... ..	50	50	49	127	39	57	
Beaver harbour, Shell islet	50	42	36	127	25	7	24 34
Cormorant island, Yellow bluff in Alert bay							
Port Harvey (<i>British Columbia</i>), Tide pole							
islet	50	33	53	126	16	40	
Port Neville (<i>British Columbia</i>) Robbers							
nob	50	31	9	126	4	21	
Thurlow island, stream at head of Knox							
bay	50	24	15	125	39	0	
Quathiasky cove, South point of island of							
Valdes island	50	2	42	125	14	38	
Baynes sound, Beak point in Henry bay...	49	36	29	124	51	18	
Nanoose harbour, Entrance rock	49	15	43	124	8	6	
Howe sound (<i>British Columbia</i>), Plumper							
cove	49	24	39	123	29	20	
Burrard inlet (<i>British Columbia</i>), English							
bay, Government reserve... ..	49	16	18	123	12	0	

S. W.	Var., E.		Latitude, N.			Longitude, W.			Var., E.
			°	'	"	°	'	"	
80		Fraser river entrance (<i>British Columbia</i>), Military barracks at New Westminster	49	18	1	122	54	26	22 52
17		Fraser river entrance (<i>British Columbia</i>), Garry point	49	7	4	128	12	1	
40	28 10	Point Roberts (<i>British Columbia</i>), Parallel station, west side	49	0	0	128	5	26	
27		Semishmoo bay (<i>British Columbia</i>), Parallel station	49	0	0	122	45	80	
82		Nanaimo harbour, Dr. Benson's house ...	49	10	15	128	56	86	28 9
82		THE ISLANDS OFF THE COAST.							
50		Cocos island, Chatham bay	5	32	57	86	58	22	
5		Malpelo island	4	0	0?	81	32	0	
55		Clipperton rock	10	17	0	109	10	0	
0		Socorro island, Braithwaite bay	18	48	14	110	54	15	9 0
80	28 80	San Benedicto island	19	20	0	110	45	0	
80		Roca Partida	19	9	0	112	2	0	
0		Clarion island, east side of Sulphur bay ...	18	20	36	114	40	19	
58		Alijos rocks	24	57	25	115	45	20	10 0
20		Guadaloupe, north point	29	10	50	118	18	80	12 0
2 0		Queen Charlotte islands, extremity of cape St. James... ..	51	57	0?	181	4	0?	24 57
3 89		" " Forsyth point in Stewart channel	52	9	7	181	9	0	26 1
2 16		" " Cumsheawas island on the north side of entrance to Cum- shewas harbour	58	1	0	181	23	0	
3 18		" " Rock on bar of Skide- gate bay	58	22	0	181	39	0	
3 45		" " Bose spit point ...	54	18	0?	181	22	0?	
8 82	28 50	" " Bar of Masset har- bour	54	2	0	182	0	0	28 0
8 8		" " Cape Edensaw in Virago sound ...	54	4	0	182	14	0	28 0
9 57		" " North point of North island	54	20	0?	193	0	0?	27 80
5 7	24 34	" " Cape Knox	54	15	0	188	8	0	
7 80		" " Sansum island in port Kuper	52	56	31	182	9	40	26 46

APPENDIX.

WINDS ON THE WESTERN COAST OF AMERICA
AND IN THE PACIFIC.

The following remarks on the winds which prevail in some parts of the Pacific, and on the North-western coast of America, are by Lieutenant James Wood, H. M. S. *Pandora*.* ;—

“The prevailing winds of the Pacific, with the exception of those on the coasts of Chil  and Peru, are little known. A few remarks, therefore, on those that obtain along the western coast of America, from the river Guayaquil to Vancouver island, as well as on the more regular and extended aerial currents which traverse the vast expanse of the open ocean, condensed from observations and information collected during a four years’ cruise over the greater part of it, may not be destitute of interest and utility, especially as the northern portion is but little known, and promises, ere long, to become the theatre of an important trade between the coasts of China and the new and rich countries which American enterprise and energy are now so rapidly peopling and raising from obscurity on the coast of California.

The whole of this extensive line may be divided into three portions or zones :—

- 1.—The intertropical, which is more or less affected by the fine and rainy seasons.
- 2.—The dry and arid portion which extends from 23° to 82° north, where the winds blow with almost the regularity of a trade wind.
- 3.—The more variable northern coast, which is subject to greater vicissitudes of climate.

I. THE INTERTROPICAL.—*Guayaquil River to Guasama Point*.—Along the whole of the coast from the river Guayaquil, in lat. 8° S., to Guasama point in lat. 2° N., the wind is mostly from south to west all the year round ; the exceptions are few, and generally occur in the fine season. Both in beating up this coast to the southward, and in running down it, the former in the months of May and June, the latter in those of October, November, and January, we had the wind from S.S.E. to W. (by the south), with a constant current to the north-eastward, the only difference being that the winds were lighter, and the weather finer in May and June as we got to the southward ; whilst the contrary took place in October and November ; and in January the weather was generally fine, with moderate breezes.

* See the *Nautical Magazine* 1850.

Choco Bay.—After entering the bay of Choco, of which point Guasacama forms the southern horn, the winds become more variable; but during the time we were in the bay (from the end of January to the middle of March) it never blew very fresh, though the weather was often unsettled and heavy rains frequent. The prevailing wind was from south-west, but north-westerly winds were not uncommon.

Chirambira Point to the Gulf of San Miguel.—When past Chirambira point (the northern horn of Choco bay) we had the wind more from the northward, and in the latter end of March had to beat up to Panama bay against north-westerly and north-easterly breezes, blowing a fresh breeze at times, especially as we approached the bay.

In surveying this last named part, in January 1848, we found the winds more variable, heavy rains almost always accompanying a change to south-west, from which quarter we once or twice had a stiff breeze.

Gulf of San Miguel to the Gulf of Dulce, including the Bay of Panama.—Between the southern point of the Gulf of San Miguel and the gulf of Dulce, including Panama bay and the coast of Veragua, the winds are regulated by the seasons. Towards the end of December the “northers” begin to blow. These are fine, dry breezes which generally come on in the afternoon, and blow very fresh from N.N.E. to N.N.W. till near midnight, with a perfectly clear and cloudless sky, and the air so dry and rarefied, that objects on a level with the horizon are distorted and flattened, and the same effects are caused as are seen during an easterly breeze off our own coast. Though generally a double-reefed top-sail breeze, they occasionally blow much harder, especially off the coast of Veragua, where, in the months of January and February, even a close-reefed top-sail breeze is not uncommon. During even the strongest of these, a dead calm often prevails 10 or 15 miles off the land, the only evidence of the gale that is blowing within a few hundred yards of you being the agitation of the water, which is raised into short hollow waves, which break on board of and tumble you about awfully.

Towards the end of March up to the middle of April, the “northers” begin to cease, and are succeeded by calms and light sea and land breezes, with occasional squalls from the south-westward. As April advances the squalls get stronger and more frequent, and by the early part of May the rainy season generally sets in, during the greater part of which south and south-westerly winds prevail: these are not very violent within the bay of Panama; but from cape Mala, westward, gales from the above quarters are frequent, and sometimes severe, bringing a very heavy sea with them.

Gulf of Dulce to the Gulf of Fonseca.—From the Gulf of Dulce, proceeding westward along the shores of Costa Rica, Guatemala, and Mexico, we find the winds still follow the changes of the seasons, modified, however, by locality. For instance, whenever the “northers” prevail, we find them blowing off the shore at nearly right angles to the run of the coast; thus, as soon as the coast of Nicaragua is approached (which takes a more northerly direction than that before mentioned), we find, during the fine season, the “northers” exchanged for breezes called ‘papagayos.’ These blow from N.N.E. to E.N.E. or E., and are accompanied by the same clear fine weather as the “northers”; the prevailing wind, however, during this season (from January to April) is from south-east to north-east. From May to November, which is the rainy season, the weather is mostly bad, gales from the west and south-west with thunder, lightning, &c., being frequent and at times violent.

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Gulf of Fonseca to the Gulf of Tehuantepec.—After passing the gulf of Fonseca, where the land again trends nearly due west, the northerly winds are lost, till on reaching the gulf of Tehuantepec we meet them once more, but under a different name, and assuming a more violent character. Along this portion where the mountains approach, and even in some places form the coast line, the winds during the fine season are the usual tropical land and sea breezes; the former from N.W., the latter from S. to W.S.W. and W. The remaining months are marked by even worse weather from the same quarters as is found on the Nicaragua coast.

Gulf of Tehuantepec to Tejupan Point.—The heavy blasts which blow over the isthmus of Tehuantepec, derive their source from the country they cross. They seem to be caused by the "northers" in the gulf of Mexico, which here find a vent through the opening formed between the Mexican and Guatemalan mountains. They blow with great force from North to N.N.E., and raise a very high short sea; their force is felt several hundred miles off the coast. During the season when they prevail (December to April) every preparation should be made to meet and carry sail through them: if this can be done they are soon crossed, and 200 to 250 miles of westing (or easting) made; otherwise, if you are obliged to heave to, 86 to 118 hours of heavy weather may be expected, exposed all the while to a very high and short sea. In the rainy season these cease; but the weather here, as along the whole coast of Mexico, is then very bad, gales and strong breezes from S.E. to S.W. constantly occur, whilst squalls accompanied by thunder and lightning, with heavy, and almost incessant rain, characterise the season throughout. These gales are at times very severe, rendering the navigation of such a coast very unpleasant, as, with one exception, there is scarcely any shelter from them to be found. During the fine season, however, nothing can be more regular or quiet than the weather on the Mexican coast; a regular sea breeze sets in about noon, beginning from S.S.W. to W.S.W., and getting more westerly as the sun goes down, decreasing with it, and gradually sinking into a calm as the night closes in. This is succeeded by the land wind off the shore, which is more irregular in its direction and force, but these winds, and the method of making a passage to the westward, along the coast, have been so well, and so truly described by Dampier and Basil Hall, that nothing remains but to add my testimony to the correctness of the accounts they give, as far as the phenomena fell under my own observation.

As soon as the coast begins to trend northerly again, which it does about Tejupan point, we meet the northerly winds which blow down the gulf of California, and which are found pretty steady during the fine season a few miles off the coast; by taking advantage of these, and the daily variations caused by the land and sea breezes, the passage is made from this point to San Blas and Mazatlan; but it is always a tedious beat, owing to a contrary current and frequent calms.

II.—SECOND PORTION OR DIVISION.—*Cape San Lucas to San Diego.*—From cape San Lucas to San Diego, or from 28° to 32° N., the general direction of the wind is from west to north, but during the winter months, or from November to April, this coast is subject to violent gales from the S.E., which, as most of the bays and anchorages are open towards that quarter, are much dreaded. This is especially the case along the northern portion of this division, as towards cape San Lucas they are less frequent; however, they always give ample warning of their approach. The only way, therefore, of making a

passage up this coast, is by standing off upon the starboard tack (—as you get out, the wind draws to the eastward—) till either the variables are reached, or you can fetch your port on the other tack. In the summer season the only alteration is that the wind is more westerly in the mornings, and draws round with the sun as the day advances.

III. THIRD DIVISION.—*San Diego to San Francisco*—From San Diego to San Francisco the wind prevails from the north-westward nearly all the year round. This coast is subject to the same south-easterly gales as the coast of Lower California, but they are more frequent here, and blow with greater force. All the bays and roadsteads are similarly exposed with the exception of the above named ports, which are perfectly secure and defended from all winds. During the winter, therefore, vessels always anchor in a convenient berth for slipping, with springs and buoys on their cables, so that on the first appearance of heavy clouds approaching from the south-east, with a heavy swell rolling up from the same quarter (the invariable signs of the coming gale), they may be able to slip and go to sea without loss of time. These gales last from 12 hours to two days, and are accompanied by heavy rain, which lasts till the wind changes, which it often does very suddenly, and blows as hard for a few hours from the north-west, when the clouds clear off and fine weather again succeeds. Off point Concepcion gales and strong breezes are so frequent as to obtain for it the appellation of the cape Horn of California. They are mostly from north to west, and frequently blow with great force, especially in the winter, when they sometimes last for three days together, without a cloud to be seen, till they begin to moderate. But here one of the most remarkable features of this coast first shows itself, viz., the frequent and dense fogs, which, during more than half the year, render the navigation from San Diego northward most unpleasant. In making the land, the only way to deal with them, is to feel your way into the coast with the lead during the day-time, as it frequently happens that a thick fog prevails at sea, while, at the same time, within a mile or two of the land, a beautiful clear bright sky, and open horizon are to be found: if disappointed in this, you have but to wear, haul off again, and heave to till the desired change does take place.

San Francisco to Vancouver Island.—From San Francisco northward to the strait of Juan de Fuca, the north-westerly are still the prevailing winds; in the months of June, September, and October, we found them almost constantly so; hard gales from all points of the compass, however, may be looked for here at all seasons, especially during the winter, and the equinoctial months. These begin generally from S.E. to S.W., bringing thick rainy weather with them. After blowing from these quarters for some hours, they fly round to the northward, (by the west), with little if any warning, except the increased heaviness of the rain, and blow even harder than before. During the spring, easterly and north-westerly breezes are more prevalent than at other seasons. In the summer months, westerly winds and fine weather prevail, but from the end of July to the end of August the fogs are so frequent that many weeks will sometimes pass without a clear day.

METHOD OF MAKING PASSAGES WITHIN THE 1ST DIVISION.—*From the southward to Panama Bay*.—From what has been said respecting the winds which prevail within the first division, it will be seen that the passage from the southward to Panama bay is easily made during the greater part of the year; but in the fine season, when within the influence of the “northers”, the following plan should be adopted. Make short tacks in-shore, as there is generally a set to the

northward found within a few miles of the land, and where that is interrupted, a regular tide is exchanged for a constant current farther off. Between Chirambira point and cape Corrientes the land is low and faced with shoals, caused by the mouths of the numerous rivers which have their outlets on this part of the coast, but after passing cape Corrientes, it may be approached pretty closely, except off Solano point, where some shoal rocky patches extend to seaward, as the coast is in general bold-to. Care, however, should be taken not to run into the calms caused by the high lands, as it is difficult to get off into the breeze again, and the swell sets in-shore where it frequently happens that no anchorage is to be found till close to the rocks.

In beating up the bay of Panama, in the fine season, the eastern passage, or that between the Perlas islands and the main is to be preferred, as, with one exception, it is free from dangers. The water is smooth, and a regular tide enables you to make more northing than it would be possible to do in nine cases out of ten against the strong current and short high sea which at this season prevail in the centre or on the western side. During the rainy season a straight course up the bay is preferable to entangling yourself with the islands, the current generally following the direction of the wind.

Panama Bay to the Southward.—But the great difficulty, at all times, consists in getting either to the southward or westward of Panama. The passage to the southward is made in two ways,—either by beating up the coast against a constantly foul wind and contrary current, or by standing off to sea till sufficient southing is made to allow you to fetch your port on the starboard tack. Both plans are very tedious, as it frequently takes twenty days to beat up to Guayaquil, whilst six or seven days are an average passage down.

Panama Bay to the Westward.—If bound to the westward during the “northers,” a great deal of time may be saved by keeping close in-shore, and thus taking advantage of them; they will carry you as far as the gulf of Nicoya. When past the Morro Hermoso, ‘papagayos’ may be looked for, and with them a course should be steered for the gulf of Thuan-tepec, and it will then depend on the port you are bound to, whether, after crossing the gulf by the aid of one of its gales, you should keep in or off shore. If bound for Acapulco, keep in, and beat up; but if bound to the westward, you cannot do better than make a west course, as nearly all the winds will allow you: but as the in-shore winds are now under discussion, we will leave the consideration of the best means of reaching the trade winds for a future occasion.

The passage to the westward of Panama, during the rainy season, is a most tedious affair,—calms, squalls, contrary winds, and currents, accompanied by a heavy swell, and extreme heat, as well as an atmosphere loaded with moisture and rain, are the daily accompaniments. It often occurs that 20 miles of westing are not made in a week, and it is only by the industrious use of every squall and slant of wind, that the passage can be made at all. Opinions are divided amongst the coasters as to the propriety of working to the southward and trying to get rid of the bad weather, or beating up within a moderate distance of the land. My experience would lead me to prefer the latter, as the strong winds and frequent squalls which so often occur near the land, sometimes allow a long leg to be made to the north-westward, while, farther off, this advantage is sacrificed for only a shade finer weather.

GENERAL OBSERVATIONS RESPECTING THE OFF-SHORE WINDS.—With respect to the winds which prevail in the open ocean, the same general rules obtain in the Pacific, as are recognised throughout the rest of the globe, i. e., a north-

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eastern trade within the limits of the northern tropic, and a south-eastern within the southern; also as to the prevalence of westerly winds when either to the northward or southward of those boundaries. There are, however, exceptions to these rules. Within the tropics, wherever large groups of islands are found, the trades are subject to great variations both in direction and force. Also to the northward of the tropic of Cancer, when bound from the Sandwich islands for the American coast, there are many instances, during the spring and summer, of 45° or even 50° of north latitude being reached, before a westerly wind could be obtained.

Galapagos Islands to Cape San Lucas.—I have already alluded to the difficulty of getting to the westward from the bay of Panama. The trade wind seems to possess no steady influence to the eastward of a line drawn from cape San Lucas, in 28° N., to the Galapagos islands on the equator. Amongst these islands the south-eastern trade wind is steady during nine or ten months of the year, and it is only in January and February, and sometimes March, that they are interrupted by long calms and occasional breezes north and north-west, but these are never of any strength. To the northward of them, the eastern limit of the trade seems to depend upon the time of the year. In the early part of April, I have found it between the parallels of 8° and 18° North, 900 to 1000 miles farther to the eastward than at the end of June; and in the intermediate months, either more or less to the eastward as it was earlier or later in the season, but in no case that I have met with has a steady or regular trade been experienced till the above line has been reached. It is this circumstance, and the prevalence in the intermediate space of westerly winds, calms, and contrary currents, that makes the passage from Panama to the westward, as far as this line, so tedious. I have been 40 days beating from the entrance of the bay, in 80° W., to the eastern edge of the trade, in 111° W., a distance of less than 2000 miles, or, on an average, about 40 miles per day.

From the Meridian of Cape San Lucas, Westward.—When once within the influence of the trades, a passage is easily made either to the southward, westward, or northward; but it must be born in mind that the eastern verge of this trade seems, in these parts, to be influenced by the seasons. Thus in June and July, I found it fresh from N.N.W., and even at times N.W., as far out as the meridian of 125° W., whereas in March and April it was light from N.N.E. to E. and E.S.E. from our first meeting it in 98° W. till past the meridian of cape San Lucas in 110° W., where I picked up a good steady breeze from N.N.E.

As a general rule the wind is found to haul more to the eastward as you get farther off the land, and I did not find this rule affected by the latitude, as, although, as I have stated, the wind hangs to the northward, and even at times to the westward of north, near the eastern limit of the trade, from the tropic of Cancer to the variables near the equator, I found it about the meridian of the Sandwich islands, as far to the eastward on and near the line as it was in 85° north, in which latitude the westerly winds are in general met with.

From the Sandwich Islands to the Northward and Eastward.—The passages, therefore, from the Sandwich islands to any part on the north-west coast of America, are made by standing to the northward till the westerly winds are reached, when the run into the coast is easily made, taking care, however, if bound to a port to the southward of you, not to bear up till well in with the

land, when, as I have said, north-westerly winds will be found to carry you down to the southward.

On this coast, as a general rule, the land should always be made to the northward of the port you are bound to, as in almost all cases the wind and current both prevail from the northward from Vancouver island to cape Corrientes of Mexico.

Though lying between the parallels of 19° and 23° north, the Sandwich islands are often visited during the winter months with strong breezes and gales from south and south-west. but for the rest of the year the trade-wind blows pretty steadily. In making a passage thence to the coast of Chile or Peru, the best way is to stand across the trade as near the wind as the top-mast-studding-sail will stand. This, as the direction of the wind is in general from E.N.E. to E., will enable you make Tahiti, and pass the Society islands by one of the clear channels to the westward of it. It is of little use trying to fetch to the eastward of these, as not only do you lose much time by hugging the wind too close, but also the strong current which sets to the westward, from 20 to 40 miles a day, is pretty sure to drift you that much to leeward; and even were this not the case, so difficult, tedious, and dangerous is the navigation amongst the archipelago of low coral islands which lie to the eastward, that unless you can weather the Marquesas altogether, it is better even to bear up, than to entangle yourself in such a labyrinth. After passing the Society islands, stand on to the southward, till, in or about the 30^{th} parallel, the westerly winds will be found. These will carry you into the coast; care being taken, as on the northern coast, not to bear up when within the influence of the southerly winds, till near enough to the land to ensure keeping them down to your port.

TRADE WINDS AFFECTED BY GROUPS OF ISLANDS.—I have before stated, when once within the influence of these island groups, the trade winds are found to be subject to great alterations and deflections, or lost altogether. This is especially the case during the time the sun is to the southward of the equator amongst those in the southern hemisphere. West and south-west, as well as north-west winds are then often experienced, and among the far western groups, heavy gales almost amounting to hurricanes are experienced, when from their latitude they should be in the very centre of the trade winds. As a proof of this deviation from the usual course of the trades when near large groups of islands, I may mention, that, when making the passage from the Sandwich to the Society islands, in June 1849, I had the wind nearly east all the way to the parallel of the Marquesas (10° S.), when it came from the south-eastward; but I left Tahiti at the same month for Valparaiso with a north-westerly wind, though this island is situated in 17° S. This carried me 500 miles to the westward, nor did I again meet the trade, though the usual boundary (the parallel of 30° S.) was not passed till I had sailed with (for the most part) a fair wind, upwards of 2000 miles to the eastward.

From the time I left Pitcairn island (18th July) to within 100 miles of the American coast, a distance of more than 8000 miles, I experienced strong winds, and sometimes gales from south round by west to north-west, only one day's interval; this being, from all accounts, the general character of winds in these latitudes."

The following remarks are from the *Mercantile Marine Magazine*, 1858, "In the year 1855, in connection with the U.S. Survey of the Pacific coast,

observations were made on the character of the winds of the Western coast of the United States, at three permanent stations, viz :—

Astoria, Oregon	- - - lat. 46° 11' N.	long. 123° 40' W.
San Francisco, California	- - - „ 37 48	„ 122 28
San Diego	- - - „ 32 40	„ 117 12

The directions of the wind were noted in points, and the observations taken three times each day, at 6 A.M., at noon, and at 6 P.M., except on Monday in each week, when hourly observations were made. From these, the following general characteristics may be said to predominate :—

1. The great prevalence of westerly winds, representing a flow of the air at the surface from the ocean in upon the land.

2. The general absence of easterly winds, showing the absence of a return current at the surface.

The proportion of westerly to easterly winds is as 8 to 1.

3. The increase of westerly winds in the summer, and their decrease in the winter.

4. That when easterly winds blow at all, it is as a rule during the winter.

5. The N., N.E., and E. winds blow more frequently in the morning, than in the afternoon hours.

6. The S.E., S., and S.W. winds are in general pretty equally distributed over the morning and evening hours.

7. The N.W. is the prevailing direction of the ordinary sea breeze at Astoria and San Diego, and the W. at San Francisco.

Sometimes the W. wind has that character at the first named stations, and sometimes the S.W. wind at the last named.

As some of the details connected with these observations will be of service to our nautical readers, they are here furnished.

San Francisco :—At San Francisco the great current of air flowing from the sea to the land comes generally from the W. or S.W., rarely from the N.W.

In the period from November to March, inclusive, the W. is the prevailing wind, exceeding in quantity both the others, the S.W. wind exceeding in quantity the N.W. In the period from April to October, the W. and S.W. winds are nearly equal, and each exceeds the N.W.

The W. wind has, in general, the features attributed to the sea breeze, beginning after the rising of the sun, increasing until after the hottest part of the day, and dying out or much diminishing at nightfall.

The W. and S.W. winds are prominent features at San Francisco.

The S.W. is the prevailing wind in June and July; S.W. and W. winds blowing nearly the whole of those months, not succeeded by an easterly land breeze—but rising and falling. May and August resemble each other, the N.W. and S.W. winds being nearly equal in quantity, and each less than the W. wind. In April and September the N.W. wind has nearly died out. The W. wind diminishes in quantity through March and February, and through October, November, and December, to January. The N.W. wind increases again from April towards December, and is very small in October and November. The S.W. wind disappears in October, reappearing in November and December, and increasing towards January. The W. wind has a maximum in April and May, and another in September and October, the minima being July and January.

The N. wind in December, January, and February, reaching a maximum

in January, is the only other point to be noticed for San Francisco, partaking with the other places in the general absence of easterly winds, although these show themselves slightly in winter. There is also but little S. wind.

Astoria and San Diego.—In general, the winds at these two places resemble each other more than those at San Francisco do either. April, May, June, July and August have the same general character.

The N.W. wind is the summer wind and has the characteristics of the sea breeze, but there is no return land breeze. The N.W. wind reaches a maximum in July, and a minimum in December. It is the great prevailing wind of the year at San Diego. As it decreases it is generally replaced by W. and S.W. winds of less quantity. In December the quantities of the three winds are nearly equal.

The resemblance of these winds at San Diego and Astoria is remarkable, the remarks just made applying generally to both places. There is, however, much less N.W. wind at Astoria than at San Diego. Except in June, July and August, there is some S. wind each month at Astoria, and especially from September through October, November, December and February. At San Diego this is less marked, the two agreeing most nearly in quantity in March, April and May.

The S.E. wind is a distinct feature in both places in February and March, and at San Diego in April and June.

The E. wind is prominent at Astoria in January, February and March, and the N.E. from October to January, inclusive.

Astoria has the most easterly wind, the N.E. beginning in October and blowing until February, and being replaced by the E. wind in March.

The summer is the windy season on the West coast,—July being one of the windiest months of the year."

The following general remarks are by Captain Basil Hall, R.N., "On the south-west coast of Mexico, the fair season, or what is called the summer, though the latitude be north, is from December to May inclusive. During this interval alone it is advisable to navigate the coast; for, in the winter, from June to November inclusive, every part of it is liable to hard gales, tornadoes, or heavy squalls, to calms, to constant deluges of rain, and the most dangerous lightning; added to which, almost all parts of the coasts are, at this time, so unhealthy as to be abandoned by the inhabitants. At the eastern end of this range of coast, about Panama, the winter sets in earlier than at San Blas, which lies at the western end. Rains and sickness are looked for early in March at Panama; but at San Blas rain seldom falls before the 15th of June; sometimes, however, it begins on the 1st of June, as we experienced. Of the intermediate coast I have no exact information, except that December, January, and February are fine months everywhere; and that, with respect to the range between Acapulco and Panama, the months of March, April, and half of May, are also fine; at other times the coast navigation may be generally described as dangerous, and on every account to be avoided.

From December to May inclusive, the prevalent winds between Panama and cape Blanco (gulf of Nicoya) are N.W. and northerly. Thence to Realejo and Sonsonate, N.E. and easterly. At this season, off the gulfs of Papagayo and Tehuantepec there blow hard gales, the first being generally N.E., and

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the latter N. These, if not too strong, as they sometimes are, greatly accelerate the passages to the westward ; they last for several days together, with a clear sky overhead, and a dense red haze near the horizon. We experienced both in the *Conway* in February, 1822. The first, which was off the gulf of Papagayo on the 12th, carried us 280 miles to the W.N.W. ; but the gale we met in crossing the gulf of Tehuantepec on the 24th, 25th, and 26th, was so hard that we could show no sail, and were drifted off to the S.S.W. more than 100 miles. A ship ought to be well prepared on these occasions, for the gale is not only severe, but the sea, which rises quickly, is uncommonly high and short, so as to strain a ship exceedingly.

From Acapulco to San Blas, what are called land and sea breezes blow ; but, as far as my experience goes, during the whole of March, they scarcely deserve that name. They are described as blowing from N.W. and W. during the day, and from N.E. at night ; whence it might be inferred, that a shift of wind, amounting to eight points, takes place between the day and night breezes. But, during the whole distance between Acapulco and San Blas, together with about 100 miles east of Acapulco, which we worked along, hank for hank, we never found, or very rarely, that a greater shift could be reckoned on than four points. With this, however, and the greatest diligence, a daily progress of from 80 to 50 miles may be made.

Such being the general state of the winds on this coast, it is necessary to attend to the following directions for making a passage from the eastward :—

On leaving Panama for Realejo or Sonsonate, come out direct to the north-westward of the Perlas islands ; keep from 20 to 80 leagues off the shore as far as cape Blanco (gulf of Nicoya) ; and on this passage advantage must be taken of every shift of wind to get to the north-westward. From cape Blanco hug the shore, in order to take advantage of the north-easterly winds which prevail close-in. If a *papagayo* (as the strong breeze out of that gulf is called) be met with, the passage to Sonsonate becomes very short.

From Sonsonate to Acapulco, keep at the distance of 20, or, at most, 80 leagues from the coast. We met with very strong currents running to the eastward at this part of the passage ; but whether by keeping farther in, or farther out, we should have avoided them, I am unable to say. The above direction is that usually held to be the best by the old coasters.

If, when off the gulf of Tehuantepec, any of the hard breezes, which go by that name, should come off, it is advisable, if sail can be carried, to ease the sheets off, and run well to the westward, without seeking to make nothing ; resting being, at all stages of that passage, by far the most difficult to accomplish. On approaching Acapulco, the shore should be got hold of, and the land and sea breezes turned to account.

This passage in summer is to be made by taking advantage of the difference in direction between the winds in the night and the winds in the day. During some months, the land winds, it is said, come more off the land than at others, and that the sea breezes blow more directly on shore ; but in March we seldom found a greater difference than four points ; and, to profit essentially by this small change, constant vigilance and activity are indispensable. The sea breeze sets in, with very little variation as to time, about noon, or a little before, and blows with more or less strength, till the evening. It was usually freshest at two o'clock ; gradually fell after four ; and died away as the sun went down. The land breeze was by no means so regular as to its periods or its force. Sometimes it came off in the first watch, but rarely before mid-

night, and often not till the morning, and was then generally light and uncertain. The principal point to be attended to in this navigation is, to have the ship so placed at the setting in of the sea breeze, that she shall be able to make use of the whole of it on the port tack, before closing too much with the land. If this be accomplished, which a little experience of the periods renders easy, the ship will be near the shore just as the sea breeze has ended, and there she will remain in the best situation to profit by the land wind when it comes; for it not only comes off earlier to the ship near the coast, but is stronger, and may always be taken advantage of to carry the ship off to the sea breeze station before noon of the next day.

These are the best directions for navigating on this coast which I have been able to procure; they are drawn from various sources, and, whenever it was possible, modified by personal experience. I am chiefly indebted to Don Manuel Luzurrugui, master attendant of Guayaquil, for the information they contain. In his opinion, were it required to make a passage from Panama to San Blas, without touching at any intermediate port, the best way would be to stretch well out, pass to the southward of Cocos island, and then run with the southerly winds as far west as 96° before hauling up for San Blas, so as to make a fair wind of the westerly breezes which belong to the coast. An experienced old pilot, however, whom I met at Panama, disapproved of this, and said, the best distance was 15 or 20 leagues all the way. In the winter months these passages are very unpleasant, and it is indispensable that the whole navigation be much further off shore, excepting only between Acapulco and San Blas, when a distance of 10 to 12 leagues will be sufficient.

The return passages from the west are always much easier. In the period called here the summer, from December to May, a distance of 80 to 50 leagues ensures a fair wind all the way. In winter, it is advisable to keep still further off, say 100 leagues, to avoid the calms, and the incessant rains, squalls, and lightnings, which everywhere prevail on the coast at this season. Don Manuel Luzurrugui advises, during winter, that all ports on this coast should be made to the southward and eastward, as the currents in this time of the year set from that quarter.

If it were required to return direct from San Blas to Lima, a course must be shaped so as to pass between the island of Cocos and the Galapagos, and to the south-eastward, till the land be made a little to the southward of the equator, between cape Lorenzo and cape St. Helena. From thence work along-shore as far as point Aguja, in lat. 6° S., after which work due S., on the meridian of that point, as far $11\frac{1}{2}^{\circ}$ S., and then stretch in-shore. If the outer passage were to be attempted from San Blas, it would be necessary to run to 25° or 30° S. across the trade, which would be a needless waste of distance and time.

Such general observations as the foregoing, on a navigation still imperfectly known, are perhaps better calculated to be useful to a stranger than detailed accounts of passages made at particular seasons. For, although the success of a passage will principally depend on the navigator's own vigilance in watching for exceptions to the common rules, and on his skill and activity in profiting by them, yet he must always be materially aided by a knowledge of the prevalent winds and weather. As many persons, however, attach a certain degree of value to actual observations made on coasts little frequented, although the period in which they may have been made be limited; I have given in the two following notices, a brief abstract of the *Conway's* passages

from Panama to Acapulco, and from Acapulco to San Blas. The original notes from whence they are taken are too minute to interest any person not actually proceeding to that quarter of the world.

*Panama to Acapulco (5th of February to 7th of March, 1822—80 days).—*We sailed from Panama on the 4th of February, and anchored on that afternoon at the island of Taboga, where we filled up our water. Next evening, the 5th, we ran out of the bay with a fresh N.N.W. wind, and, at half-past two in the morning of the 6th, rounded cape Mala, and hauled to the westward. As the day advanced, the breeze slackened, and drew to the southward. In 24 hours, however, we had run 140 miles, and were entirely clear of the bight of Panama. It cost us nearly 6 days more before we came abreast of cape Blanco (gulf of Nicoya); at first we had light winds from S.S.W., then a moderate breeze from N.N.W., which backed round to the eastward, and was followed by a calm; during each day we had the wind from almost every point of the compass, but light and uncertain. Between the 11th and 12th, we passed cape Blanco, with a fresh breeze from S.S.E. and then S.S.W., which shifted suddenly to the northward, afterwards to the N.N.E., where it blew fresh for upwards of 24 hours, and enabled us to run more than 280 miles to the W.N.W. in one day. This breeze, which is known by the name of *papayayo*, failed us after passing the gulf of the same name, and we then came within the influence of adverse currents. On reaching the longitude of 92° W., on the 16th, we were set S. 16° W., 77 miles; on the 17th, N. 16 miles; on the 18th, E. 51 miles; on the 19th, S. 78° E., 68 miles; on the 20th, S. 62° E., 45 miles; on the 21st, S. 87° E., 17½ miles; all of which we experienced between 91° and 93° W., at the distance of 20 or 80 leagues from the shore; meanwhile we had N.N.E. and northerly winds, and calms.

After these currents slackened, we made westing as far as 98½°, by help of N.N.E. and easterly winds. On the 22nd, 23rd, and 24th, we were struggling against north-westerly winds off Guatemala, between 14° and 15½° N. latitude. This brought us up to the top of the bay of Tehuantepec at sunset of the 24th; we then tacked and stood to the westward. The weather at this time looked threatening; the sky was clear overhead, but all around the horizon there hung a fiery and portentous haze, and the sun set in great splendour; presently the breeze freshened, and came to the north by west, and before midnight it blew a hard gale of wind from north. This lasted, with little intermission, till six in the morning of the 26th, or about 80 hours. There was, during all the time, an uncommonly high short sea, which made the ship extremely uneasy. The barometer fell from 29.94 to 29.81, between noon and 4 o'clock, p.m., but rose again as the gale freshened; the sympic someter fell twelve-hundredths. This gale drove us to the S.W. by S., about 140 miles. A fine fresh breeze succeeded from N.N.E., which carried us 120 miles towards Acapulco, and left us in longitude 97½° W. and latitude 15° N., on the 27th. This was the last fair wind we had on the coast; all the rest of our passage, as far as San Blas, being made by dead beating. The distance from Acapulco was now less than 180 miles, but it cost us 8 days' hard work to reach it, principally owing to a steady drain of lee-current running E. by S., at the following daily rates, viz., 18, 16, 27, 37, 25, 10, 9, 7, and 9 miles. The winds were, meanwhile, from N.W. to N.N.W., with an occasional spurt from S.E. and S., and several calms. We had not yet learned the most effectual method of taking advantage of the small variation between the day and night winds.

Acapulco to San Blas (12th to 28th of March, 1822—10 days).—This passage was considered good for the month of March, but in the latter days of December, and 1st of January, an English merchant made it in 10 days, having a fair wind off shore nearly all the way. A merchant brig, which passed Acapulco on the 6th of February, at the distance of 150 miles, was a fortnight in reaching cape Corrientes, and nearly 8 weeks afterwards getting from thence to San Blas, a distance of only 70 miles. There is, however, reason to believe that the vessel was badly handled.

It would be useless to give any more detailed account of this passage than there will be seen in the preceding remarks. We generally got the sea breeze about noon, with which we laid up for a short time W.N.W., and then broke off to N.W., and so to the northward, towards the end of the breeze, as we approached the coast. We generally stood in within a couple of miles, and sometimes nearer, and rounded in from 15 to 25 fathoms. If the breeze continued after sunset, we made short tacks, in order to preserve our vicinity to the land, to be ready for the night wind. With this we generally lay off S.W., sometimes W.S.W. and W., but only for a short time. After passing latitude 18°, the coast trended more to the northward, and a much larger leg was made on the port tack, before we were obliged to go about. As we approached cape Corrientes, in latitude 20°, the land winds became more northerly, and the sea breezes more westerly; so that, as the coast also trended off to the northward, a more rapid advance was made.

During our stay at San Blas, from the 28th of March to the 15th of June, we had light land-winds every night, and a moderately fresh breeze from west every day, with the thermometer always above 80°.

Towards the end of the period, the sky, which had been heretofore clear, became overcast; the weather lost its former serene character, becoming dark and unsettled; and, on the 1st of June, the periodical rains set in with great violence, accompanied by thunder and lightning, and fresh winds from due south. This was nearly a fortnight earlier than the average period. The heat and closeness of the weather increased greatly after the rains set in; but although our men were much exposed, no sickness ensued, excepting a few cases of highly inflammatory fever. The town was almost completely deserted when we came away; the inhabitants having, as usual, fled to Tepic and other inland towns, to avoid the discomfort and sickness which accompany the rains.

As soon as the rains subside, in the latter end of October, or beginning of November, the people return, although that is the period described as being most unhealthy, when the ground is still moist, and the heat of the sun not materially abated."

The remarks that follow are by Commander C. B. Hamilton, R.N.,* "The west coast of Mexico is considered highly dangerous in the bad season, viz., from June to 5th November, and all the vessels obliged to remain in the neighbourhood lie up, either in the secure harbour of Guaymas, at Pichilingue, or in the bay of La Paz, all in the gulf of California.

The hurricanes that occasionally visit this coast are so much dreaded, that

* See the *Nautical Magazine*, 1849.

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in the months of July, August, September, and October, the ports are deserted, and trade ceases. I believe the *Frolic* is the first vessel of any nation, whether men-of-war or merchant-ship, that ever remained the whole bad season on the coast,—and, that off the two most dangerous ports, viz., San Blas and Mazatlan. I shall therefore give all the information I can, relative to the bad season.

The hurricane so much dreaded on this coast is called the *Cordonazo de San Francisco*, a name given by the Spaniards on account of the hurricane prevailing about the time of San Francisco's day, the 4th of October, the word *cordonazo* signifying a heavy lash with a rope or whip; but from my own experience, and all I can learn, these *cordonazos* may be expected any time from the middle of June to the 5th of November; the worst ones that have been experienced of late years having occurred on the 1st of November, although the weather usually clears up about the 20th of October, and sometimes even sooner; and as soon as the weather does begin to clear up, a ship may, with common precautions, venture into the anchorages again, for this reason,—as soon as the weather has cleared up, the change in the appearance of the sky and weather will give ample warning of a coming hurricane, whereas, in the previous four months before the weather has cleared up, the thing that adds to the danger of this coast is, that owing to the threatening appearance of the sky every evening, and the violent thunderstorms and squalls at night, accompanied by heavy rain and lightning, the wind veering about, you are first led to believe that the hurricane is coming every night, and latterly you see it is utterly hopeless to foresee the coming of it, as, every night, appearances were as bad as they could be; the barometer here being of little or no use, and a tremendous occasionally setting in. Thus the remaining off this coast during the hurricane season will cause great anxiety.

The squalls and gales usually commence about S.E., and quickly fly round to the southward and S.W.; you have generally time to get to sea when it commences at S.E.; but, as I have before shown, you must go to sea every night, if you can, if you would be free from the danger of the *cordonazos* coming on. But a tremendous swell frequently sets in whilst the weather is in this threatening state, and the wind still light, which makes it impossible to get out. Moreover, if our boats happened to be out and on shore when the swell came, it was impossible to hoist them in; and for this reason we have frequently been obliged to send our boats from the ship, with their crews, to be hauled up on shore, and remain there until the swell went down, that I might be ready to slip and go to sea.

It appears that the *cordonazos* come on an average once in 6 or 8 years, and we experienced none during our stay, although we had a gale on the night of the 21st of September. I was fortunately under way, and had plenty of room when it came on, having stood out to sea on the evening of the 19th, on account of the weather being bad, and fearing the full of the moon on the 20th.

It commenced about 9h. 30m. P.M., from S.E., flying round to S.W.; heavy rain, thunder, and lightning, with a very heavy sea, reducing us to close reefed main-topsail, and fore-staysail, washing away a boat, and obliging us to batten down. The squalls came on very suddenly, the prevailing winds being in the bad season from S.E. to S. and S.W., and the heavy swell usually before and after the full and change of the moon. The swell is such as is seen in the bay of Biscay in a heavy gale, and unfortunately usually sets into the bays before the wind comes.

I therefore think that a ship caught at anchor off San Blas or Mazatlan by a *cordonazo*, would have small chance of escape, especially off the former, as she would either go on shore or go down at her anchors; to slip and stand out the instant it commences from S.E. is her best course.

The range of the thermometer for June was 77° to 86°; July, 80° to 87°; August, 81° to 89°; September, 88° to 92°; October, 88° to 90°.

The barometer appeared to be of little service, usually remaining at 80 inches; seldom varying above a tenth, except during a heavy squall, when it rose considerably.

Our anchorage off San Blas during the bad season was usually in 12½ fathoms, soft mud,—Piedra de Mer, N. 58° W.; Piedra de Tierra just open southward of the bluff to the southward of San Blas river, N. 47° E.; point off watering-place, N. 72° E.

Off Mazatlan, during the same season, in 28 fathoms, soft mud; centre of Crestin isle, N. 18° E.; north-west extreme of North Venado isle, N. 28° W.; southernmost rock on south side of Mazatlan, N. 80° E.; small black rock nearly covered, N. 28° E.

I should not recommend a ship to lay closer than this, which is the best berth to get out from, in case of bad weather.

Excellent biscuit can be procured at Guaymas, at a very moderate price; and a most superior spirit, not inferior to the best whiskey, called Tequilla Mascal, can be procured in any quantity at San Blas, at a very reasonable price, by applying to the consul at Tepic.

After the 4th of November the coasting and other vessels again make their appearance on the west coast of Mexico. San Blas is very sickly during the bad season. Guaymas is healthy, although the thermometer stands there at the astonishing height of 106° in July, August, and September, and owing to the extreme dryness of the atmosphere, ships receive much injury, by the wood opening. Furniture, apparently well seasoned, there cracks and falls in pieces.

On this coast there are some immense fish of the ray species. I caught one of them, and with difficulty hoisted one on board; it measured 19 feet in breadth across the back, the mouth was 8 feet 5 inches wide, and the flesh was 8 feet 6 inches deep in the centre. I had no means of ascertaining the weight, but found I could not lift it with the yard tackles and 60 men, it requiring 180 men, with the heaviest purchases in the ship, to hoist it in.

These fish are common on the west coast of Mexico and gulf of California, where they are more dreaded by the pearl divers than sharks, or any other fish."

GENERAL REMARKS ON PASSAGES TO VARIOUS PORTS, &c. &c.

The following general sailing directions for the coast of California are by Commander W. P. MacArthur, U.S. Navy (1850).*

* These were drawn up after the preliminary examination of the coast, preparatory to the survey.

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"Previous to giving sailing directions for this part of our coast, I propose to notice the character of the winds, at different seasons, with their effect upon the sea and currents.

From March to October the prevailing wind along the coast, and for many miles to the westward, is fresh from the north-west, being freshest from 10h. A.M. to 2h. P.M., and not unfrequently falling light during the night. During this season of the year, the north-west wind blows with almost the regularity of a trade-wind. During the months of August and September, fogs prevail to a great extent, and impede and endanger navigation materially.

During the greater part of the year above-mentioned, there were no heavy gales of wind and little or no rain.

These winds cause a current of about half a knot per hour along the coast, setting to the southward.

From October to March the wind is variable, both with regard to velocity and duration. During this season heavy gales occur from the south-east, south, and south-west, generally accompanied by protracted rain, and causing a very heavy sea and swell along the coast.

The current during this season sets generally to the northward, varying in velocity with the strength of the wind.

These facts being known, it is now to be considered how directions should be given which would be most useful to navigation.

Sailing vessels bound to the northward from Monterey, or any more northern port during the summer season, should stand well off-shore, not too close hauled until, about 200 miles from the land, when they will be beyond the influence of the southerly current, and in a situation to take advantage of a slant of wind, which frequently occurs from the W.N.W. They would do well not to approach the land, unless favoured by the winds so as to enable them to lay their course, or nearly so, until up with the latitude of the destined port.

Steamers should follow the coast from point to point as nearly as possible, always keeping within 15 miles of the land. They will by this means shorten the distance, and frequently avoid the strong north-west wind, as they will often find it quite calm close in with the shore, when there is a wind to seaward.

Vessels bound to the northward in the winter season should keep as close along the land as practicable, and take every advantage of all southerly winds to make latitude. They should always endeavour to make the land at least 20 or 30 miles to the southward of the destined harbour.

If bound to the southward keep the coast in sight, and take advantage of either tack upon which the most latitude may be made, always making the land to the northward of the port in summer, and to the southward in the winter season.

Bound to San Francisco or Monterey, use every opportunity to observe for latitude and longitude, so as to know the vessel's position up to the latest moment, as fogs and haze, preventing observations, prevail near the land. Allow generally for a southerly set of ½ a mile per hour, until within about 50 miles of land; after which, at times, it is not appreciable. With these precautions vessels may steer boldly on, shaping a course for the South Farallon, an islet about 250 feet high and a mile long, having 14 fathoms water, and good holding-ground on the S.E. side.

On approaching soundings the water becomes of a pale green colour. Soundings may be had in 60 to 40 fathoms, soft ooze, if approaching point

Reyes. Below 40 fathoms is near the land, and the surf should be heard, if haze prevents the land from being seen. If the soundings are 80 fathoms or under, and the sea smooth, anchor with a kedge until the land becomes visible, so as to take a compass bearing, as the position cannot otherwise be relied on.

If up with the South Farallon and night approaching, or there are appearances of fog, anchor at the Farallon and wait till daylight, when the morning breeze will carry the vessel to the bar, or pilot-ground.

Inside the Farallones the 'set' is generally towards the north shore, which may be approached without risk, keeping outside of the kelp, that marks rocks under water.

Duxbury reef is 6 miles, W. by N. $\frac{1}{2}$ N., from Bonita point, projecting nearly 2 miles from the bluff; is well marked by the bluff, and the sea generally breaks on it.

To enter San Francisco without a Pilot, bring Alcatraz island in range with Fort point, and run c. 1. This gives point Bonita a good berth, and all dangers on the south shore are plain in sight.

If bound into Monterey, shape the course for point Ano Nuevo, in order to avoid point Pinos. At Ano Nuevo there is no danger clear of the shore line. When up with cape Ano Nuevo, point Pinos (the only point where the pines reach the sea,) will be clearly seen, and as the beach rises to view the town of Monterey also. Give the south shore a good berth, (most necessary near night, as it generally falls calm,) and stand on; anchor nearest to the western shore, a short distance from the wharf. The holding-ground is good, and with good tackle vessels can ride at anchor in safety at all seasons of the year.

Going out, make long stretches towards point Ano Nuevo, in order to avoid the 'set' and swell off point Pinos.

The bay of Carmel, south of point Carmel, must be carefully avoided.

Point Reyes is a high, bold, and very prominent headland, visible in clear weather 50 miles.

Between May and October vessels may anchor in Drake bay, but it is not advisable, as a kedge is equally safe to preserve position outside in case of fog.

From point Reyes to Bodega the coast is variable in height, but clear of danger, and with a commanding breeze may be approached at pleasure. Should the wind fail when to the northward of point Reyes, drop the kedge on reaching 80 fathoms, as the swell will set the vessel gradually towards the beach.

Falling in with the land northward of Bodega, do not pass inside of fixed kelp, as it indicates foul ground.

From Bodega to cape Mendocino the coast consists of high, bold cliffs, with but few indentations; the dangers are only at the shore line.

Near cape Mendocino is Blunt reef (a small patch of rock under water), sea generally breaking upon it. There is a clear channel, $2\frac{1}{2}$ miles in width, between the reef and the Sugar-loaf rock at the cape.

There are no dangers from cape Mendocino to Trinidad head; the beach may be approached to within a mile, and the anchorage is good all along the shore in 18 fathoms.

Having passed westward of cape Mendocino, Trinidad head will be readily recognised. Trinidad bay is an open roadstead, only available from April to November. The southerly winds of winter render it an unsafe anchorage. To enter, pass between the main round bluff (or headland)

and the islet until the town is opened, when anchor in 8 fathoms, good holding-ground. In April and October anchor well outside, to have room for getting under way if necessary. Do not pass inside the Turtles, as the ground is broken and the swell generally heavy.

North of Trinidad head do not approach the shore closely, unless the breeze is steady. The dangers are in plain sight. At night it generally falls calm, and if calm the swell will set the vessel too near the beach.

Klamath river has usually about 15 feet on the bar at low water, and is sometimes not difficult of entrance with a good breeze, but very difficult to get out of, the current running so strong that sailing vessels must come out *stern foremost to be steered*.

Port St. George is a safe anchorage in the summer at the point indicated by the anchor. The reef off cape St. George consists of rocky islets. The in-shore channel is good and clear, and shown by the track of the schooner *Ewing*. From Pelican bay, with a breeze, take this channel.

From cape St. George to Rogues river, there are no special dangers. In the summer, vessels may anchor anywhere along the coast, and there are landing-places south of all the rocky points. Rogues river has but 10 feet on the bar, is rapid, and passes between high mountains.

Avoid the kelp, which indicates rocks under water, and do not approach the shore at night.

Ewing harbour is a safe anchorage in summer. There is no surf in the landing cove.

From cape St. George to cape Orford, the coast is thickly inhabited by bands of wild Indians, and care is necessary not to be surprised by them

There is a reef of rocky islets off cape Orford.

From cape Orford to cape Arago there is apparently no danger outside the beach.

The Kowes river has not yet been examined. The anchorage to the northward of the bluff is good.

The Umpquah is accessible for steamers, and for small sailing vessels only, under very favourable circumstances. When off cape Arago, in clear weather, the high sand bluffs of the Umpquah are plainly seen.

The coast from Umpquah river to the Columbia is generally bordered by a sand beach, with white sand hills, and the interior is densely wooded with fir or pine. The cliffs, when they occur, are bold, but afford no shelter for anchoring. In the summer, a vessel may anchor in 20 fathoms off any of these beeches.

When proceeding northward in winter, make Killamook head, and if the weather renders approach to the bar of the Columbia undesirable, keep southward of cape Hancock, as the current is northerly in winter.

There are usually good pilots in attendance at the mouth of the Columbia, and the chart of the entrance and bar will give directions for approaching. The pilots are usually off the south channel, in a small schooner showing a fly at the main. If not seen, fire your guns.

To avoid mistaking Shoalwater bay for the mouth of the Columbia (the soundings being similar) make Killamook head. Never omit this in winter. There are no dangers off the beach northward of Killamook head, and the soundings in approaching it are regular.

Note.—Notwithstanding the remarks as to the general fact of the winds prevailing in the N.W. and N.N.W. quarter during the summer, it is proper

to state that, in the month of June, 1850, the winds to the northward of San Francisco were light from the southward and westward, with showers north of Mendocino for the whole month, and the coasters ran to the northward with all steering sails.

It is, however, yet to be demonstrated whether June is a regular period of southerly breezes."

The following is by Mr. Masters, a gentleman in the Merchant service, who was for some time engaged in trade on the west coast of Mexico, (1839.) "On the whole coast of Mexico (on its Pacific side) from June to November, the weather is very tempestuous, with rain, thunder, and lightning, and in many parts of it this season is also very sickly. On the coast of Oajaca, and in the gulf of Tehuantepec, the rainy season generally commences about the end of April, or the beginning of May, from which time the roadsteads are very unsafe, until the bad weather breaks up, which is in December, and on the sea of Guadalajara and Sonora in November.

The dry season is generally fine, the sky generally clear, and the winds moderate, and rain falls very seldom. From our leaving Mazatlan, in January, to our sailing from the coast of Oajaca, on the 1st of April, we had not even a sign of a shower.

A heavy fall of dew is almost a sure indication of a breeze from the northward. A few hours previous to its springing up, the air becomes sultry and parching, and continues so during the time the "norther" is blowing. In the gulf of Tehuantepec, particularly, the "norther" is very uncomfortable. A dismal haze hangs over the land, and the wind comes off in gusts as if it had passed over a furnace, veering from N.N.W. to N.N.E. On the western coast it is generally to the westward of North.

In the dry or summer season, a vessel bound to the northward of cape Corrientes from Chil , or round cape Horn, should cross the equator in long. 105  or between it and 110 , and proceed due north if possible. The wind in her progress to the northward will haul round from S.E. to E. and N.E., with a current setting in the same direction as the wind is blowing, or nearly so, and at times at the rate of 1 mile per hour. It is very probable that in standing with the starboard tack on board, that westing will also be made. If a ship be on the port tack, and the wind supposed to be N.N.E., she would make a very bad landfall, taking the current into consideration, even allowing her to be as far north as 15 , but by standing on as far as the latitude of cape San Lucas, there is every chance, indeed almost a certainty, of having the wind from the north-west, and at the same time the whole range of coast under the lee. I stated this opinion to the captain of an American whaler who had been on the coast several times; he fully agreed with my observations, and said that the prevailing wind on the coast of California is north-west, and that the best way to make a short passage to the gulf of California or Mazatlan would be to keep clear of the coast of Mexico, and stand well to the northward. In the winter, or rainy season, as the wind is often from the south and east, a direct course would be most advisable.

In my passage to Mazatlan we did not stand to the northward, as I afterwards found, far enough, although we did not tack to the eastward until we were in latitude 18 , the wind in general being N.E. As we got to the eastward the wind gradually hauled to the northward, when we made the coast of

Mexico, about 40 miles to the south-east of cape Corrientes, from which it took us three days to get to the southward of the Marias islands. When in-shore, the wind, when it blew fresh, was from the N.W.; and when moderate, from N. to N.N.E. In the morning we had an irregular land-breeze, the current setting constantly to the S.E. From the Marias islands we were two days getting to Mazatlan, with the wind as already stated.

It appears that in the gulf of California, in the dry or summer season, the wind is mostly from the N.W., strong breezes, with a short chopping sea. The coasting vessels always keep the California shore aboard in beating up the gulf.

The port of Guaymas is said to be the best on the whole coast of Mexico. It is also more healthy than any on the southern part of the coast. Vessels in the rainy season lay up here; it is the only place, with the exception of San Blas, that can be considered safe, on this part of the coast."

Lieutenant S. Osborn says:—

"A vessel anxious to keep on the coast of Mexico or its neighbourhood, during the bad season, cannot do better than run over to the bay of La Paz, on the west shore of the gulf of California, and but little to the north of Mazatlan. This splendid harbour is formed by the main land of South California on the starboard hand going in, and a long chain of islands with shallow passages between, on the port hand. The most eastern island is Espirito Santo, the north end of which lies in about lat. $24^{\circ} 80' N.$, long. $110^{\circ} 22' W.$, and has a large rock due north of it, distant 5 miles.

Approaching this bay from Mazatlan, the island of Ceralbo will be first made, high and mountainous, north end lat. $24^{\circ} 28' N.$, long. of south end $109^{\circ} 45' W.$; from it Espirito Santo will be seen, bearing about W. by N. The bay is at least 80 miles deep, and for the first 20 miles a deep bold shore on either hand, no bottom with 20 fathoms close to the islands. Large vessels anchor under the island of San Juan Nepomezcino; but small ones anchor within $\frac{1}{2}$ mile of the village of La Paz: fish, water, turtle, cheese, and fruits are to be obtained here; and cattle, also, in the wet season, when pasturage is to be found on the coast. Snakes are very numerous and venomous.

A knowledge of the tides and currents in the neighbourhood of this port would be very serviceable; it has been much frequented by the Americans during their operations against Mexico. A vessel bound to California could only have one object in making the Mexican coast, *en route*, namely, that of communicating with her owners, by overland despatch through Mexico, and as that is a possible occurrence, I will give the few following notes for general guidance.

A vessel making the passage northward from San Blas had better make an in-shore tack, until she reaches the latitude of, or sights cape San Lucas, as she will there get the true wind, which blows almost without intermission along the line of coast from the northward. A west, or may be south of West course will only be first made good, but as the offing is obtained, the wind will be found to veer a little to the eastward. However, it will always be the object to make headway, and get out of the tropic without any reference to the longitude, as a strong north-west wind will soon in lat. 25° or 28° run off the distance, provided you have sufficient northing.

The attempt to beat up in-shore amounts to perfect folly, if it does not deserve a worse name, a strong current accompanying the wind; and the

latter must be taken into consideration, when running in for your port with westerly winds.

Should a vessel, however, be bound to California direct, I would cross the Equator in the Pacific ocean in about 100° W. long. Cross the N.E. trade with a topmast-studdingsail set, and thus pass into the limit of the westerly winds, about 800 miles to windward of the Sandwich islands, and once in them take good care to keep to the northward of my port, for as you approach the shore, the wind will draw round north, and the current to the southward increase.

San Francisco has only two drawbacks, that of a narrow entrance in an unsheltered line of coast, where fogs are both sudden and dense, and the sudden manner in which the rollers set in on the bar at the mouth. A merchantman, however, is not so likely to miss his port when its being correctly made depends principally on knowing his latitude."

The following extract from the remarks of H. M. S. *Spy*. Lieutenant-Commander S. O. Woolridge, as to Mazatlan and Muleje bays, gulf of California, may prove interesting, though there are in it many points stated, irrelevant to the present purpose:—

"Our passage from Callao to Mazatlan, of a few hours less than 26 days, is considered exceedingly good; indeed, one of the best ever made. As we drew in-shore, I found the current affected by the wind. With northerly winds, the current set to southward, and *vice versa*. We remained at Mazatlan 10 days, during which time the weather was, upon the whole, fine. At night we had occasionally strong squalls, with rain.

July 17th, 1847, weighed for Guaymas. All the charts of the gulf are miserably incorrect, and not to be trusted; but, I see no difficulty in navigating it by the lead. The water appeared to shoal very gradually from 17 to 6 fathoms, when I always tacked. I used to stand into 10 fathoms at night, and 6 by day. As far as I can judge, Captain Hamilton's (*Frolic*) positions of the coast are very fairly correct; and there is no doubt we are indebted to him for a capital assistance in navigating the gulfs, in the absence of all Government charts. The shoal laid down in black in his chart, off Ignacio point, I passed over; but, I placed the island further to the eastward (in lat. 25° 22' N., long. 109° 18' 36" W.) than Captain Hamilton's red Ignacio isle.

I arrived at Guaymas on the 21st, in four days from Mazatlan. During this passage, we experienced strong currents running to the N.W., from 1 to 1½ miles an hour. They were much influenced by the wind, which, from the 19th to the 21st, was south-easterly and southerly. Current also runs with more force on the eastern shore, which side we kept.

Cape Haro can be easily distinguished by the Tetras, or Paps, which resemble the teats of a goat; they are to the northward. The island of San Pedro Nolasco is just visible from the deck, to the N.W. The land of the Yagui shore is high and peaked; keeping this broad on your starboard bow, steer to the northward of a deep bay where the land breaks off, and you will soon perceive the island of Pajaros, which is at the entrance, or facing Guaymas. The water is deep all along the island of Pajaros, that is to say 4 fathoms, so close as to throw a biscuit on shore.

A large ship will have to anchor soon after passing Pajaros; that is, abreast the Morro, in 5 fathoms. A small ship can anchor inside the isles of Ardilla

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and Almagre, and in 4 and 8½ fathoms, just inside them; and in 8 fathoms, as far in as the point off the town. You may go close to either of the isles Ardilla or Almagre, in 8 and 8½ fathoms.

Fresh beef and vegetables are to be obtained here, but the price depends greatly on the season of the year. In August, when the *Spy* was there, it was a bad time of the year, being the hottest season; the thermometer averaging 98° (Fahr.), in the shade when the country is very dry, and there is no herbage for cattle, which makes it difficult to obtain, and higher in price. The *Spy* paid eight dollars a quintal for it, and the same for vegetables; but in October I am told it is much lower. There is also very good flour to be obtained here, between July and March, that is, all the end and beginning of the year; and with little difficulty (chiefly depending on time) very good biscuit can be made. In August this article is also scarce, and dear in comparison, because the new batch of flour is just coming in, and the difficulty of transportation from the interior is very great, owing to no herbage for the mules. I contracted for 640 quintals of biscuit for H.M. ships *Constance* and *Spy*, at ten dollars the quintal, to be delivered at the contractor's house, and bags found by purchaser. Flour at this time was sixteen dollars the carga, or 800 lbs. But I am told in September and October it will fall to nine dollars the carga, when biscuits will be proportionably cheaper. Water is very difficult to be got; it is to be obtained by sending about 4 miles for it, or it can be purchased; but owing to its having to be brought in on mules or in carts, the price is very high. I wanted 12 tons, which I found could not be obtained for less than \$80; which would be nearly ten shillings a ton; I therefore weighed, August 10th, and proceeded to Muleje bay.

"Conception point is difficult to make out, when you have about a dozen of the same kind within a few miles of each other. However, the best marks I can give are some table-land which is very remarkable, and is rather to the right of Muleje village. Keep this about two points on your starboard bow, and you may stand in, until you discover some sandy islets which are off a point called Punta San Ynes. When you are east and west with them, you will be distant from them about 8 miles. After passing these islets, steer S. and S.S.W., until you make out the Pyramid rock, spoken of by Captain Hamilton. This rock is named Sombbrero, or Little Hat. I think it bad to call it Pyramid rock, as there is a point which, in standing in, may be easily mistaken for it, resembling also a pyramid; but the rock is a pyramid fixed on a round pedestal like a fort. Another good way of making out this place is, when the wind is fair, to keep Tortuga island about 20 miles (?) distant, bearing about N.W., and steer in S.E., till you make out the sandy islets, and proceed as above. There is a passage between the islets and the main land for small vessels, but, though very inviting, should not be attempted. I tried it, but getting into 2½ fathoms, I put about as quick as possible. My anchorage marks in Muleje bay were as follow, in 5 fathoms:—Point Conception, N. 84° E.; Tortuga isle, N. 4° W.; Lobos isle, N. 2° E.; Sombbrero, S. 67° W. (Pyramid rock of Captain Hamilton); Equipalito, S. 22° W. (Rock on south side of entrance to the river); and Punta San Ynes, N. 10° W.

This is very close in, but I wished to facilitate the watering; about ¼ a mile further to the northward, in 8 fathoms, is a very good berth. In going into the bay after making out the Sombbrero, if you wish to go close in, take

care not to bring the Sombrerito at all on your starboard bow; that is, do not open the mouth of the river, as, by sounding, I discovered a rock with only one fathom on it; it is on a sand-bank with 8 fathoms all round it, about three-quarters of a mile from the shore; but the rock itself has only one fathom. It lies with the entrance of the river open, directly between the Sombrerito and the Equipalito rocks, distant from half to one mile off shore. I am surprised Captain Hamilton has not mentioned it, for I must have gone very close to it, in rounding my vessel to.

The report of the facility of watering is very delusive and uncertain. In the first place I cannot think it possible to water out of the river, as it is salt for at least 2 or 2½ miles, and a great portion of the time, boats could not possibly get up so far. I was there, fortunately, when the moon was nearly full, and the water was only low between eleven at night and four in the morning, so that I was enabled to water about 18 hours out of 24, and though I had but one small boat (28-feet cutter), I managed to get 12 tons in two days. She had to go 1½ miles up the river, to the house of Joseph Padras, and the casks were rolled about 100 yards to a small stream in his garden; with a force pump it might be obtained without running the casks. The water is delicious to drink at the stream, but it is so very low, and our water, after being a day or two on board, became so black, and smelt so strong of decayed vegetable matter, that, though it improved by keeping, it served chiefly for cooking and washing.

In going up the river, in boats, keep close to the Sombrerito, and keep the starboard shore on board, till you are one or one and a quarter miles up the river, when you will encounter a sand-bank in the centre of the river, and must keep over on the port shore to clear it. Abreast this sand-bank is the Rancho of Joseph Padras. At the time I visited this place, in August, owing to the dryness of the season, and the want of fodder, there was no beef or vegetables to be procured. The bay is open to the north-east winds, and there is no shelter from the sea, which rolls in heavily; but with all other winds I think any man-of-war could get out, if she did not leave it too late, till the sea was too heavy, as there is plenty of room for beating.

The passage from Guaymas to Muleje bay can be easily done in 20 hours. I left Muleje again on the 14th, and arrived at Guaymas on the 16th, being 86 hours. On the 26th of August I sailed from Guaymas for Mazatlan, where I arrived on the 8th of September, in eight days. This, at this season of the year is considered very fair, as south-easterly winds and calms prevail. I kept over, by advice, on the western shore, and passed inside of Catalina island; but I think the more you can keep in mid-channel the better. We experienced little or no currents, but the wind was very light, and the weather fine all the way.

On the 30th and 31st of August we had an easterly current, about 14m. per diem. We anchored off Mazatlan, about 4 miles off Crestin, on the following bearings, 23 fathoms water:—Crestin island, N.N.E. ½ E.; Rock, N.E. ½ E.; Venado, N.N.W.; and Town, N. by E. ½ E. This is a very good berth for a large ship like the *Constance*, but on the 8th I went about 1½ miles further in, with the following bearings, in 22 fathoms water:—Crestin, N.N.E. ½ E.; Town, N. by E. ½ E.; and Rock, N.E. ½ E. This is a very good berth for a small vessel, and quite far enough off for safety, and more convenient when you have occasionally to communicate with the shore, with only one boat fit for the purpose. Here I lay till the 28th of September: during the whole

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time we experienced light winds and generally fine weather. The nights were always and invariably attended with heavy thunder, and very vivid lightning, and generally heavy rain with an occasional squall.

On the morning of the 19th we experienced a very heavy squall, which lasted for about two or three hours, and the water regularly boiling, which, for the time, made me imagine that it was the commencement of a very heavy *cordonazo* ; but in four hours it had passed off, and was quite fine. As far as I could judge, the weather was not worse than you would meet with anywhere at certain seasons, but the rolling your boats into the water every now and then is the natural consequence of being anchored 3 or 4 miles off the land, in the open sea where the current at times keeps the ship swung across the wind.

On the 23rd, the barometer being very low all day, the moon being near the full, and the sun near the Equinox, it was deemed advisable to weigh, but we experienced nothing more than very terrific lightning and thunder, with heavy rain.

On the 26th, I weighed for Guaymas again. During this passage, of seven days, we had very light winds, and chiefly from the north-west.

On the 2nd October, we experienced a very heavy long rolling swell, from the south-east, which lasted two days. It was subsequently accounted for by being informed that on that day, at Mazatlan and San Blas, it blew a very heavy gale of wind ; but in the gulf we had no wind but only the swell.

We arrived on the 4th of October, and sailed on the 6th for Mazatlan, where we arrived on the 18th, in seven days. During most of this passage, the winds were very light and variable, and I kept about the mid-channel. The last three days, though the wind was from south-east and south-west, the current ran to the southward, from half a mile an hour. I anchored outside Crestin, about 2 miles at first, but requiring about 28 miles tons of water, and seeing two merchant-ships inside, I weighed on the 16th, and ran in also.

Anchorage marks :—Town, N. by W. $\frac{1}{4}$ W. ; Crestin, N.W. by W. $\frac{1}{4}$ W. ; Outer rock, S. $\frac{1}{4}$ E. At this season it is better not to anchor nearer Crestin, as in case of blowing you have room to drag.

PASSAGES TO AND FROM VARIOUS PORTS IN THE PACIFIC.

The following remarks on passages to and from various ports on the coast of western America, and in the Pacific, are by Captain Beechey, R.N. :—

“KOTZEBUE SOUND TO CALIFORNIA.—These passages were made from October 14th to 7th November, 1826, and October 6th to 29th, 1827, when north-westerly winds prevail, and consequently at a favourable time for getting to the southward. In both years they occupied exactly 28 days ; and it is further remarkable, that in each, the Aleutian islands were passed on the ninth day after our departure. The route pursued by the *Blossom* was to the westward of King island, and between St. Lawrence island and the mainland of America, and thence, within sight of St. Paul's and St. George's islands, to the strait of Onnimak.

To the eastward of King island the soundings are very irregular, varying from 9 to 6 fathoms; and as at the season above mentioned the weather appears to be generally bad, it is advisable to go to the westward of the island, where the water is deep. Between St. Lawrence island and the continent of America there is a bank with 11 fathoms water upon it. If, on approaching it in foggy weather, it be doubtful, from the shoaling of the water, whether it be not the island that is the occasion of the decrease of soundings, haul over to the American shore, and the water will deepen. To the southward of St. Lawrence it is necessary only to mention the islands of St. Paul and St. George, which apparently may be safely approached within 4 or 5 miles; but I could not get near them in either year to ascertain what dangers lie close off the shore.

I should recommend the passage being always made to the eastward of these islands, as between them and Ounimak there is a strong current from Bristol bay, which in 1827 drifted the *Blossom* 85 miles to the S.W. in the course of the day. The strait of Ounimak, lying between the islands of Ounimak and Ougamok, appears at present to be the safest opening to the Pacific from Kamschatka sea. The Aleutian islands in the autumn appear to be enveloped in fog about half-way down, and to have a region of mist lying to windward of the archipelago, which makes it necessary for a ship to be certain of her position, before she attempts any of the channels as she might be led down so close upon the land in the fog, that she would not have room to rectify a mistake, should she unhappily incur any, which is very likely to happen, from the irregularity and velocity of the currents about the islands. Under these circumstances I should recommend making the north-west end of Ounimak, and afterwards keeping along the coast of that island to the southward. As this island lies 40 miles to the northward of the other islands of the chain, Ounimak excepted, which is three degrees to the westward, it cannot be mistaken, unless the reckoning of the ship is very incorrect indeed. And by so doing, in the event of not liking to attempt the passage, a vessel will still be far enough to windward, supposing the breeze to be from the northward, to weather the other islands of the chain; and if from the westward, she may reach into Bristol bay.

We had no opportunity of seeing the summits of either Ounimak or Ounashka, which, when clear, are good guides for the strait; but when the low land of the former can be seen, the south-west point of Ounimak may be known by a pointed rock situated near the base of a remarkable wedge-shaped cliff, conspicuous from the northward and north-westward. The narrowest part of the strait is between this rock and Ougamok island, and the distance exactly $9\frac{1}{4}$ miles, in a S. $1^{\circ} 80'$ E. (true) direction. In a line between these, at the distance of 4 miles from the rock, there are soundings in 30 fathoms, and I understand that if necessary there is anchorage close under Ounimak.

Ougamok island is about 4 miles in length, and may be known by a remarkable peak near its N.E. extremity, in lat. $54^{\circ} 16' 52''$ N. and long. $164^{\circ} 47' 3''$ W.

From the Aleutian islands to San Francisco we steered nearly a direct course, with winds generally from N.W. and W., and made Point Reyes on the 8th November. In this passage the currents were variable. From Behring strait to the Aleutian islands they prevailed to the westward, and near the islands ran strong, but afterwards they continued between S.E. and S.W. On our arrival off California, the whole amount, in 1826, was S. 89° W., 64 miles; and in 1827, S. 26° W., 40 miles.

MONTEREY TO OAHU, SANDWICH ISLANDS.—This passage (January 5th to 25th, 1827,) was begun at a period when the north-west and westerly winds are proverbially prevalent upon the coast of Oregon, and extend a considerable distance to the westward.

We sailed from the bay of Monterey on the 5th of January, and immediately took a northerly wind, which carried us into the trades; and we arrived off Maui on the twentieth day. Our passage might have been considerably shorter, had we not taken a circuitous route in search of some islands reported to lie to the southward, and had sail been carried throughout the 24 hours, instead of hauling to the wind as soon as it was dusk, to maintain our position during the night, that nothing might be passed unseen within the limit of our horizon.

As we left the extra-tropical latitudes, the atmosphere gradually became more hazy and humid, the clouds increased, and in 18° N. we had some showers of rain. On the 18th, in lat. $16^{\circ} 18'$ N. and long. 186° W., we had a very strong trade at N.E., with squally weather, and a long cross sea from the westward, which was afterwards found to be the effect of a gale of wind in the parallel of 21° N.; but which did not reach us.

There was very little current in this passage; this little generally ran to the southward and westward, and averaged 3.6 miles a day. The barometer, though so far entered in the tropical latitudes, was perceptibly affected by the changes of weather, but maintained its horary oscillations.

On my arrival I found that from the 15th to the 21st there had been very strong gales from the westward at Oahu, and from S.W. at Hawaii. This was, no doubt, the cause of the high cross sea we experienced from the 18th to the 23rd. I found also that the *Harbinger*, an American brig which quitted Monterey nine days after the *Blossom*, was obliged to lie-to for three days, from the 20th to 23rd January, in a strong gale from the S.W. She had steered a direct course from the Sandwich islands, in which she experienced very variable winds, and, on the whole, had bad weather, and was only one day less performing the passage than ourselves; whence I think it fair to conclude that nothing is lost by running well into the trade. During the winter season, I should recommend ships gaining the 17th parallel before they shaped a direct course for the islands. This seems to me to be the best mode to ensure a good passage and fine weather.

SAN FRANCISCO TO SAN BLAS (MEXICO).—We found no difficulty (December 6th to 21st) in getting to the southward, the prevailing wind at this season being from the N.W. It is advisable, however, to stand about 40 or 50 leagues off the coast, to avoid interruptions from variable winds, which occur near the land. These winds are in general taken advantage of by vessels bound in the opposite direction to that of our present course.

The weather throughout this passage was remarkably fine. The wind was from W.N.W. to N.N.E., until we made Cape San Lucas, when it veered to E.N.E., and obliged us to pass between the Marias islands. This route occasioned the loss of a day, and I should advise any vessel making the passage to close the land to the northward of Cape San Lucas, provided the wind is in the north-east quarter; as in addition to the inconvenience which a shift of wind to the E. would occasion, there is another arising from a strong current, which generally sets out of the Gulf of California. From the Cape steer for Isabel island, and thence for Piedra de Mer.

Between 83° N. and cape San Lucas we found a current to the westward, and from the cape to the Marias islands to the southward. The whole effect of current from San Francisco to these islands was $S. 58^{\circ} W., 80$ miles.

SAN BLAS TO ACAPULCO AND VALPARAISO.—At this season (March 8th to May 1st, 1828) north-westerly winds prevail upon the coast between San Blas and Acapulco, inclining towards the land in the day, and to the sea at night. We passed 4 miles to westward of Corvetena (a small rock situated N.W. by N. 19 miles, from Cape Corrientes,) without having soundings in 80 fathoms. On the 10th were within sight of the volcano of Colima, 12,008 feet above the sea, and on the 18th anchored at Acapulco.

At San Blas we heard various opinions upon the best route from Acapulco to Valparaiso, some being in favour of a passage to the eastward of the Galapagos, by keeping along the land, and carrying the N.W. wind, and others to the westward, by steering at once out to sea. We adopted the latter mode of proceeding; and after light and variable winds, principally from the eastward, crossed the equator in $99^{\circ} 40' W.$ on the eleventh day of our passage, about two degrees more to the westward than was intended.

After two days' unsettled weather and hard showers of rain we got the S.E. trade in 8° S. latitude. It was at first held to the southward, but, as we proceeded, veered gradually to the eastward, and obliged us to make a long sweep, in which we went as far to the westward as 108° , and having brought us into 28° S. and 106° W. it left us. We had afterwards variable winds and squally weather, and found some difficulty in approaching our destination. At this season very unsettled weather prevails on the coast of Chile, and storms and heavy rains from the northward are by no means unfrequent. It appears to me to be advisable at this period to steer direct for the port, if possible, and to disregard the chances of winds and of currents near the land. The currents in the first part of this passage ran about 7 miles a day to the eastward, but from 8° N. and 98° W. to 19° S. and 108° W. they flowed in a $S. 88^{\circ}$ W. direction, at the average rate of about 28 miles per day, and on our arrival at Valparaiso they had drifted the ship $S. 81^{\circ} W., 401$ miles, or at the average rate of $11\frac{1}{4}$ miles a day.

On account of these strong currents it is desirable to cross the equator well to the eastward, in about longitude 96° or 97° W., and to pass the latitudes in which they prevail as quickly as possible, by keeping clean full."

SAN FRANCISCO TO PERU.—The following remarks are by Maury and are extracted from an article on the subject in the *Mercantile Marine Magazine*, 1854:—

"The best route from California to the guano islands of Peru, is the track from California to the United States, until the belt of the S.E. trade winds be crossed; or until they will allow the guano bound vessel to lay up for her port. Though the guano islands are in 12° S., vessels bound to them from California will frequently have to go as far south as 35° to 40° , or even further, before they can lay up for them.

When a vessel, therefore, bound for Peru, comes out of San Francisco, her best course is to run down for the equator, about its intersection with the meridian of 115° to 120° (125° is not too far) and with topmast studding-sail set, to stand on to the southward until the wind hauls so as to allow her to lay up for her port; or, when the wind fails so to haul, she should keep on

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south across the calm-belt of Capricorn, and with the west wind on the polar side of these calms, run down easting enough, so that when she returns to the S.E. trades, they will lead her into port.

The usual passage from California to these islands now occupies from 65 to 70 days; by the route here recommended, it should not be so long. The way is plain; dash down from California, not caring to make easting until the winds are fair for Callao. Every homeward bound vessel from California crosses the track of the guano traders from Australia.

The *Comet*, to where she crossed it (lat. 49° S., long. 107° W.), had 28 days; and from this crossing (which is out of the route from San Francisco to Callao) the guano traders from Australia have usually from 20 to 25 days to Callao.

The passage from San Francisco to the guano islands of Peru ought not, on the average, to occupy more than 55 days."

ENGLAND TO VANCOUVER ISLAND.—The following remarks are by Captain J. F. Trivett, late of the Hudson Bay Co's. service, and now Examiner in Navigation to the Local Marine Board at the port of London:—

"The colonies of British Columbia and Vancouver island, although so little known or appreciated at present, are destined at no distant period to become very important possessions of Great Britain; the former containing all the elements necessary for the formation of a Western Canada, with considerable mineral wealth—as gold, silver, &c.; and the latter, in addition to its inexhaustible mines of fine coal, not only possesses valuable fisheries, but its fine harbours are available at all times for ships of the largest size, and in the interior, hemp is found growing wild, which having been tested in England has been pronounced equal to that of Russia.

One great drawback in connection with these colonies has been the length of a voyage from England. May not this be amended—I shall endeavour to shew that it can.

The passages from England to Vancouver island have hitherto been very long, I admit; but yet, if we take the average of those passages it will be found not to exceed that of the passages from England to Calcutta and to Australia, when the navigation to those places was as little known as the proper route to Vancouver island appears to be at present. I am convinced that a stout ship, of good sailing qualities, could, on the average, make her passage from England to Vancouver island under 120 days.

Having made many voyages to that part of the world, my present object is to give my experience as to the best route to be adopted in making a passage from England to Vancouver island.

Of that part from the Channel to the Equator—the old beaten track—nothing need be told; however for the information of those who may not have seen Commander Maury's valuable "Sailing directions," I would say—do not bother yourself about where you are to cross the equator providing you do not go to the westward of 81°; but, of course, no man would choose such a leewardly position if he could avoid it. I have twice crossed in 81°, and found no difficulty in weathering cape San Roque; and I have frequently passed to leeward of Fernando Noronha.—Should you be driven to the westward after crossing the line, take every advantage of the shifts of wind, and stand to the eastward occasionally, so as to keep cape San Roque on a certain

bearing, and do not fall to leeward of it. Maury cites instances of American ships crossing the line in 85° west, and even then weathering cape San Roque without much difficulty. I consider ships from England should cross the line between 27° and 81° W. I have not crossed east of 27° W. for some years.

After passing cape San Agostinho, I would keep about 150 to 180 miles from the outline of the Brazil coast, endeavouring to cross the southern tropic in about 89° W.; then steer in a direct course to pass 40° S., in about 56° W. If, in the neighbourhood of the river Plate, about the full or change of the moon, strong S.E. breezes may be expected: I have generally carried double reefs, and made good runs with them; off the river Plate the water is generally discoloured a considerable distance seaward; I have obtained soundings in $40^{\circ} 24' S.$, $56^{\circ} 81' W.$ —70 fathoms fine sand; from the above position I would endeavour to make the land about Valdes peninsula, or cape Dos Bahias,—if I could do so without loss of time; I consider those places better than cape Tres Puntas or cape Blanco, as dangers exist in the vicinity of the last named position and extend some distance from the land. After passing cape Blanco, I steer a true South course for cape San Diego or to windward of it, variation allowed 19° E. increasing to $21\frac{1}{2}^{\circ}$ E. off cape San Diego.

I consider this to be an important part of the passage; and a great improvement on the old route—outside or east of the Falklands; along the inner route you frequently meet with heavy breezes from off the land, which of course, will induce you to keep in with the land to obtain the benefit of the smooth water, and at such times (under close reefs and reefed courses), I have made good days to the southward; when by the old route, outside the Falklands, I should have been laying-to, drifting to the N.E.

No danger exists between the Falklands and the main, but a bank of soundings is laid down on the charts, by which, in thick weather, it is useful to test your reckoning. American ships frequently make cape Penas, Tierra del Fuego, which I think not unadvisable, although I have never done so myself.

If the wind, weather, and daylight serve, always go through the strait of Le Maire. In October 1856, I entered the strait about noon, with a fresh N.W. breeze, kept about 5 miles distant from the Fuegian shore, and at 2.30 p.m. was clear of the strait. With a N.W. wind keep well out from the high land of cape Good Success, as you are likely to get becalmed under its lee,—at least, such was my case, as also that of a ship in company—both had to run out S.E. to get the true breeze. I have twice attempted the strait since that voyage, but on each occasion was driven back by strong southerly winds. During my last voyage I lay-to very comfortably under the lee of Staten island during a heavy gale from S.W. which lasted 30 hours, Bar. 28.77.

There is no danger to apprehend in approaching the east coast of Patagonia, from strong easterly winds, as Captain Symley and American Captains engaged in the sealing trade can testify. Captain Symley has passed 22 years of his life between south Shetland and the river Plate, and for 6 years was never to the northward of 40° S.; during all that time he never knew the wind to blow heavy, directly on the shore, for 12 hours continuously.

The prevailing winds on the East coast of Patagonia are West and N.W. In steering from the east end of Staten island towards cape Horn, a strong in draught from the southward towards the strait of Le Maire (to N.N.E.) should be guarded against.

When up with cape Horn, little is required to be said, beyond what is evident to the sense of every navigator—make westing—whatever you do—make westing—but to make it, there lies the rub; to do so, or to endeavour to do so, very often tries both ship and crew severely, yet sometimes I have been lucky enough to get round this abominable cape with little or no trouble. I see no necessity to go so far south as some recommend; I would at all times lay my ship upon that tack which makes the most westing—endeavouring at the same time to maintain a sufficient offing to make good use of a S.W. wind.

Much difference of opinion exists as to the utility of the barometer in this part of the world, some Captains go so far as to say a ship is better without one; for my own part I have never seen the mercury fall greatly without a change following it—with wind, rain, or snow; yet after the change I have known the mercury to remain low, ranging about 28.50 for several days with very fine weather, and at such times have generally had more wind after the mercury had commenced rising.

In no part of the world that I am acquainted with (and I have been pretty well all over it) is such constant attention to the appearance or signs of the weather requisite as in the neighbourhood of cape Horn. I have frequently been compelled to take in sail as quick as possible—from all sail to a close reefed main topsail—and glad to get that in also.

After having rounded the Horn, and attained the longitude of 80° W., it is advisable to steer about W.N.W., if the wind will allow you, for the purpose of making your westing where the degrees are short; you can afterwards steer more northerly in the S.E. trades, and bring those winds more on the beam; but it is seldom that such a westerly course can be steered in this locality, for the prevalent winds are from the N.W. quarter, and you are frequently compelled to make easting with your northing. It is no uncommon occurrence to make the island of Juan Fernandez,—indeed, ships may be driven to the eastward of it by the continuance of westerly winds. I once carried the westerly winds as far north as San Felix island.

Having obtained the S.E. trades, which you will usually do about the southern tropic, steer to cross the equator in longitude 118° W.

Here again, the *New Route*, if I may be allowed the term, differs from what I shall call the *Old Route*. Ships formerly used to cross the equator in about 104° W., and frequently used to make the Clipperton rock. By thus crossing the equator too far to the eastward, you are more likely to meet with calms, rains, squalls, and the usual equinoctial doldrums; and are less likely to meet the N.E. trades until well north—in the summer time, probably not have them at all, and a very long passage may be the result. From the researches of Commander Maury we have the passages of 445 vessels from cape Horn to California, with the longitude of their crossing the equator, and the result is that the best passages are made by those ships which cross the equator in longitude 115° to 120° W.; the principal cause of this being that they meet with less calms, and get the N.E. trades sooner than those ships do which cross further to the east.

Having got the N.E. trades, which you do generally in about the parallel of 7° N., it will be better to make a fair wind of them; at least, endeavour to cross the northern tropic in longitude 134° W.—not to the eastward of that; as a general rule, the further you are from the coast of North America, the more likely you are to have a fresh N.E. trade.

In January 1859, I crossed the northern tropic in the Hudson Bay Company's steam vessel (under sail alone) in long. 127° W., the winds gradually failing, until at length it fell quite calm, when we got up steam: about the same time the Honourable Company's ship *Princess Royal*, 7° further to the westward, had a fresh N.E. wind, which she carried as far as 40° N., shewing the advantage to be gained by keeping well to the westward.

After losing the N.E. trades, and having got through the belt of calms which sometimes exists outside their northern border, N.W. winds are generally met with; my plan is to get cape Classet on a N.E. bearing as soon as possible, and then steer for it, because N.W. and S.E. winds being very common about the entrance of the strait of Juan de Fuca, both those winds will be fair.

Approaching the entrance of the strait in the night, or in thick weather, a ship should be certain of her latitude; and it is safer to be in error to the northward than to the southward. The coast of America south of cape Classet is dangerous to approach in thick weather, as rocks lie some distance off the shore. I have remarked, by the colour of the water, that a bank of soundings appears to exist off the entrance to Barclay sound, Vancouver island; but the water darkens again in colour as you proceed eastward; the south coast of Vancouver island should be avoided when there are light winds; as, should it fall calm, you will be at the mercy of the heavy swell almost always setting on the shore; and rendering it at times difficult to get off the coast. I once narrowly escaped destruction about Bonilla point by drifting close to the shore during light baffling winds from the southward. I will add, you soon lose sight of the light on Tatoosh island (as you proceed up the strait) by the projecting land about Néé-ah bay. The prominent and projecting land about Callam bay and point Pillar is in each case a very good mark to distinguish your whereabouts during almost any night, if you keep your course along the southern shore, which is generally thought to be the safest. The light on the Race rocks is an excellent one, and renders the navigation of that part comparatively easy. A navigator visiting these regions should provide himself with the small charts of the several anchorages about the strait, such as Néé-ah bay, port San Juan, Sooke inlet, Becher and Pedder bays, &c., as well as the charts of the various anchorages in the neighbourhood of cape Horn.

Ships from sea bound up the strait of San Juan de Fuca should steer for the light on Tatoosh island at the entrance of the strait, and in doing so the latitude at least should be correctly known; but as in the winter time, in this climate, the sun may be clouded for many days consecutively, it will be necessary to embrace every opportunity of ascertaining the latitude by sidereal observations, and by double altitudes of the sun when visible; it is safer to be in error to the northward, than to the southward—the coast of Vancouver island being comparatively bold to approach, and the high land in the neighbourhood of Barclay sound, a little westward of the entrance of the strait, is visible at a great distance, even in the night, if it be clear.

With the wind from the southward or S.W., you may expect to feel the influence of a set to the northward, as you approach the coast.

With light S.E. or easterly winds, do not approach the Vancouver island shore, when outside the strait: those winds are very likely to leave you becalmed near the land, and at the mercy of the heavy swell which is almost always found setting on to the shore—which I once painfully experienced.

Having made out the entrance, pass the lighthouse on Tatoosh island at a safe distance, say 3 miles, and proceed up the strait, keeping the southern

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shore on board, and in doing so, the light will soon be lost sight of, by the projecting land about Néé-ah bay. The bay is easily distinguished, and although it will afford good anchorage in case of necessity, it had better be avoided by sailing ships of large size, as vessels have been driven on the surrounding reefs by the tide, when getting under way, and before any command of them could be obtained. The Americans generally avoid it.

When abreast of Néé-ah bay, the deep indentation on the coast of Vancouver island which forms port San Juan will be plainly visible, even in a dark night.

As you proceed up the strait, keeping about 8 miles distant from the line of the southern shore, the projecting land forming the east point of Callam bay is a good landmark in the night. Callam bay is said to afford shelter during strong easterly winds.

From above Slip point, the point alluded to in the preceding paragraph, the coast is bold and may be approached with safety as far as point Pillar, which is another remarkable landmark, and serves the mariner to distinguish his position even in a dark night; when seen from the eastward during the night, it appears like a little round island, or headland, jutting out into the strait.

When abreast of point Pillar, from a ship's topsail-yard, or from the height of 60 feet, in a clear night, the light on the Race rocks will be visible distant about 23 miles; and from an ordinary ship's deck, or 16 feet, it will be visible at about 18 miles, a brilliant *flashing* light.

Having once sighted the Race rock light, do not lose it by standing over to the north shore, and shutting it in by Beechey head.

When abreast of Sooke inlet the tide rips and eddies will begin to be felt. These eddies sometimes take charge of a ship in light winds and turn her round against helm and sails, for which reason ships should be careful to keep out of the stream of tide of the Race rocks. With light winds, vessels have been carried through the Race channel by the force of the tidal current, and others, not so fortunate—the *Nannette*, a recent case for example—was driven on the rocks and sunk in about 4 fathoms. Ships, therefore, unless with a commanding breeze, should keep well out from the Race rocks.

With a commanding breeze from the westward, round the lighthouse at the distance of about $1\frac{1}{2}$ or 2 miles, and if bound to Victoria or Esquimalt, in the day time steer direct for your port, or to windward of it according to wind and tide. Pilots will come out from Victoria upon your making the requisite signal. For Esquimalt or Royal bay, the chart and Captain Richards' directions will be quite sufficient.

In the night time, with a commanding westerly breeze round the Race rocks, as above, and gradually haul up to the N.W. or as far as the wind will allow you, for Parry bay, or until you bring the Race light to bear S. by E.; you will then be pretty well under shelter of the land, and may get your heavy sails furled if it be blowing hard, or otherwise considered necessary.

Shortly after rounding the Race rocks, you will see the light on Fisgard island at the west side of the entrance to Esquimalt harbour. In hauling up for Parry bay, do not shut in this light with Albert head. You may pass Albert head at the distance of $\frac{1}{2}$ a mile or less, then bring Fisgard light to bear N. by W., steer for it, and anchor in 12 fathoms, an excellent berth and good holding ground.

When passing Albert head, you will have no bottom with the hand lead, but stand boldly on under easy sail, and you will soon find 17, 15, 13, and 12 fathoms. Anchor as above directed.

If bound to Victoria with an easterly wind, and should you be up with the Race rocks during the night, it will be prudent for a stranger to continue working to the eastward, giving the Race rocks a good berth, (and also guarding against Ediz hook, on the American shore, which is low and very dangerous in a dark night) until the light on New Dungeness is visible from the deck; then from the bearings of the two lights there can be no difficulty in maintaining a safe and weatherly position until daylight, when a course can be shaped according to circumstances.

Pilots are always in attendance for Victoria harbour. They are attentive and skilful; vessels drawing 17 feet can enter at any time of tide with safety. The harbour accommodation is very limited, and ships discharge their cargoes generally by laying alongside the wharves, where they ground at low water; the best and safest wharves are well up the harbour, towards the bridge.

Vessels from Victoria, bound down the strait, meeting with a fresh westerly wind, had better remain at anchor in Royal bay, until there is a prospect of a fair wind—for little good can be done in the narrow part of the strait with a foul wind.

Port Angelos, on the southern shore, is a good and safe anchorage; New Dungeness should be avoided. But should vessels be well to leeward and caught by a westerly gale, port Townshend will be found an excellent harbour. For these last named anchorages, the chart with Captain Richards' directions will be found amply sufficient to enable any stranger to take his ship to a place of safety.

A fixed white light is now placed on Admiralty head, which must be of great service to vessels running for port Townshend in the night.

Vessels sometimes anchor on what is called "The Bank," between point Wilson and point Hudson when shelter only is required; a good berth must be given to point Wilson to avoid the reef which lies off it—also to point Hudson for a similar reason."

COAST OF MEXICO AND GULF OF CALIFORNIA.

The following notes on the west coast of Mexico and gulf of California are from the work of M. Duflot de Mofras, published in 1844.* They furnish some information not embodied in the part of our work which refers to that coast.

"The coast westward of Acapulco has a westerly direction; is low and consists of what is known as the beaches of Coyuca. At point Jequepa the shore trends rather more northerly, and after continuing thus 26 leagues, there is a projecting point the Morro de Petatlan, a high mountain easily recognised by the islets surrounding it. Between this point and numerous white islets is the little port of Sihuatango. All this coast is bordered with villages and salt pits, and there are no rivers of importance. All this coast is safe to

* *Exploration du territoire de l'Oregon, des Californies et de la Mer Vermeille, exécutée pendant les années 1840, 1841 et 1842. Par M. Duflot de Mofras, attaché à la Légation de France à Mexico.*

approach, but there is no anchorage. The river Sacatula which issues from the volcano of Jurullo; also those of Canuta and Coalcaman, are not navigable. The bays of Tejuapan and Santiago, southward and eastward of the promontory of Tejuapan, can be considered only open roadsteads.

From point Tejuapan the general direction of the coast is almost due North for about half a degree; it then inclines a little to the westward as it approaches the harbour of Manzanilla, and includes within this space the rivers Coaguana, Apisa and Armeria.* The southern point of Manzanilla harbour is named San Francisco or Ventanas; the north point will be recognised by the two high hills of Jeluapan, and by the coast being covered with palm trees.

Manzanilla or Salagua port is infinitely superior to the open roadsteads of San Blas and Mazatlan. It contains four excellent anchorages and vessels of considerable draught of water can anchor in it at all times. To find the bay, when at a distance from the land, it is necessary to get into its latitude and then steer in for the coast, having as a landmark the double peak of the volcano of Colima. When near the port, the entrance of which is wide, it will be seen that it is divided into two bays by Pelican point which runs to the southward;—the eastern bay is named Manzanilla; the western, Browning, and it is in this latter that the best watering place is to be found. When the wind is from southward, it is preferable to anchor in the eastern bay, which may be reached from the entrance by steering in a N.E. $\frac{1}{2}$ E. direction; the anchorage is in 6 $\frac{1}{2}$ to 9 fathoms opposite San Pedrito rock. The western bay may be reached by steering N.E. $\frac{1}{2}$ N., and passing the Frailes rocks, which surround the second point of Juluapan, the anchor should be cast in 5 or 6 fathoms behind the hill, at a short distance from the shore.† To attain the anchorage in this bay with a leading wind, steer North a little easterly or westerly to avoid Pelican rock off Pelican point, which point it has already been observed is directly opposite the entrance. The tide occurs every 24 hours, the flood in the morning and the ebb in the evening; it rises about 7 feet, and the current runs to the southward.

At Salagua water and wood are very abundant, and bullocks very cheap. There may also be obtained vanilla, tortoise (with good shell), fine pearls, shell-fish which furnish purple colour, and many excellent woods such as ebony, mahogany, &c. &c.

The port of Manzanilla has been opened to foreign vessels, and received many rich cargoes from Europe; but in 1836 the jealousy of the merchants of Tepic and San Blas caused it to be closed, as well as Mazatlan which was opened more recently to external commerce.

The advantageous situation of Salagua is such that it possesses greater facilities for supplying the provinces of Colima, Mechoacan, and Jalisco; and above all it is able to furnish more rapidly, and at less cost, merchandise to Guadalajara and the celebrated fair of San Juan del Rio.

Manzanilla is at about 20 leagues from the city of Colima, the capital of the territory of that name. The road from the sea is sufficiently good for carts, and the distance might be considerably diminished by means of a short

* These rivers are not mentioned in the Admiralty chart No. 516.

† The Sisters rocks appear to be in the way of this course. See the plan of Manzanilla bay in the Admiralty chart No. 516.

cut, which would place the port in communication with the salt lagoon of Cuyutlan, navigable by large flat boats. With the exception of frequent earthquakes (and *goitres*, with which the inhabitants of Colima are affected) there is nothing remarkable in the city; the population amounts to about 20,000, who are wholly occupied in agriculture and commerce.*

At 8 leagues from Manzanilla bay in an E.N.E. direction is the volcano of Colima, the most western of the Mexican volcanoes. Its summit is 11,995 feet high; it is in activity and emits sulphureous vapours, cinders and stones, but no lava has flowed from it for a long period. The diameter of its crater is 492 feet, and its edge jagged. The sides of the mountain are barren and cliffy. The sulphur on it is of bad quality. At a league northward of the volcano there is an extinct crater, the summit of which is covered with snow; this is 695 feet higher, and consequently has an elevation of 12,690 feet. The great height of these mountains renders them visible from a considerable distance at sea, hence in clear weather they form an excellent means of recognising the land when approaching Manzanilla.

The valley in which Colima is situated is apparently formed of volcanic products and decomposed lava. No minerals are found in it, but only very beautiful specimens of porphyry. The vegetation of the plain consists of palms, aloes, pomegranates and fine orange trees. Upon the higher lands are forests of sombre pines, covering the part of the Sierra Madre which extends almost to Valladolid.

Between Manzanilla bay and cape Corrientes are the three anchorages Guatlan, Navidad and Tamatlan; these are but little frequented.

GULF OF CALIFORNIA.—The entrance of the gulf of California is bounded geographically by cape Corrientes (in the province of Jalisco) on the east, and by cape San Lucas (at the south extremity of the California peninsula) on the west. It was designated by the first Spanish navigators under the name of the Red or Vermilion sea (*Mar Rogo*, *Mar Vermejo*), on account

* Sir Edward Belcher, R.N., remarks on Manzanilla bay as follows, 1888. See 'Voyage of the *Sulphur*.'

"This port has a good anchorage, and is well protected against the southerly winds prevalent during the rainy season; but, on account of a very considerable lake of stagnant water in its immediate neighbourhood, is very unhealthy during the summer. Infested by myriads of mosquitos and sand flies, even in the dry season, it is nearly impossible to reside there.

This port has been open to foreign countries for several years, but has not been able to make much progress. The port itself has not a single house, and the first adjacent town is Colima, formerly the capital of the territory bearing the same name, now embodied with the department of Mechoacan.

Colima, it is true, is a large town, of considerable consumption, containing about 38,000 inhabitants; but the distance from the port (30 leagues, or 18 hours' travel), and the difficulty of communication, the roads being passable in the dry season only, naturally augment the expenses on any mercantile transaction to such a degree that it scarcely pays, as any cargo which could be introduced would be merely to supply the district of Colima. Such drawbacks, added to the detention, deter vessels from touching at Manzanilla.

Another cause which must draw the maritime trade from Colima and Manzanilla is the preferable market at the capital of Guadalajara, for its produce of sugar, maize, coffee, cocoa, indigo, &c.; and as these articles are not eligible for exportation, on account of the high cost prices, the foreign merchant could only deal in cash payments; whilst Guadalajara, which is generally over-stocked with goods, *via* Tampico on the East and San Blas on the West, can supply Colima with the necessary merchandises by barter.

The articles saleable at Colima are linens, cotton goods, woollens, and a little hardware; but, as already stated, in small quantities, calculated perhaps for the consumption of about 10,000 or 15,000 souls."

(Manzanilla and other ports on the W. coast of Mexico are now places of regular trade.)

of the colour of its waters, and for its resemblance to the Red sea of Arabia. The learned Jesuite missionaries traversed it entirely, calling it *Seno* or *Mar Lauretaneo*, gulf or sea of Loreto, in honour of the Virgin, protector and patroness of the apostolic enterprises of the society.*

The length of the gulf is about 800 leagues; its greatest breadth is 60 leagues at its entrance; but throughout its extent the distance from one side to the other does not exceed 25 to 40 leagues. Beyond the thirty-first parallel, its breadth rapidly diminishes to the Rio Colorado, which falls into it at its head, and divides California (U.S.) from Sonora. The configuration of the Adriatic gives a very good idea of that of the gulf of California.

It has been often remarked, that a singular phenomenon occurs here, which science does not explain, and of which we possess but few examples;—it is that of rain falling when the atmosphere is quite clear, and the sky perfectly serene. Humboldt and Capt. Beechey have related the fact; the first having testified as to its occurring inland, the second in the open sea.

Tides are felt throughout the gulf of California; their height varies with the direction and force of the wind, and the configuration of the coasts: thus it is 7 feet at Mazatlan, the road of which is open; and at Guaymas, the port of which is strewn with islets, and sheltered from the wind, it does not exceed 5½ feet.

Independently of a great number of fish, of a variety of species, there are two species of immense shark (*el tiburon*, and *la tintoreira*) found in the gulf, which often seize the pearl fishers. Whales are also met with in considerable numbers, but, up to the present time, no whaler has pursued them; and the inhabitants are quite ignorant of this productive fishery. On the islands are numerous seals and sea-calves, the furs of which are very thick; there are, we believe, no beavers. The pearl fishery is, or rather was, also followed.

The two coasts of the gulf of California run parallel with each other toward the N.W.; they are very low and full of salt marshes, tenanted by alligators, reptiles, and insects. The general aspect of the country is horrible; the imagination cannot conceive anything more naked,—more desolate. There is an entire want of water and vegetation; there are only mangroves, and some thorny plants, such as the *cactus*, magueys (aloes), or acacias, to be seen. Orange trees or palms are rarely met with, and one must proceed some leagues into the country to find vegetable mould. The shore is formed by sand and lands quite unfit for cultivation.

At the entrance of the gulf, on the eastern side, may be seen in the distance, the summits of the Sierra Madre; these separate the provinces of Jalisco, Sinaloa, and Sonora, and those of Nuevo Mexico, Chihuahua, and Durango. The coast of Lower California presents, without interruption, a series of rugged peaks of volcanic origin, and without any vegetation. This mountain chain, which comes down from the North, and extends throughout the whole peninsula, gradually decreases in elevation as it approaches cape San Lucas.

* There are apparently only two reasons why the gulf of California was called the Vermilion Sea; these are probably—1st the colour imparted to the water during the rainy season by the rivers draining a ferruginous country, the river Colorado especially, and —2ndly the beautiful purple colour which the waves take at sunset and sunrise. In the day time the waters are blue or green according as the clouds intercept or modify the solar rays, conjointly with the nature and depth of the bottom of the sea. It is also possible that the colour may be owing to banks at its surface, composed of myriads of crustacea somewhat similar to the prawns of the coasts of Europe.

The eastern side of the gulf of California, between latitudes 28° and 32°, consists of the coast of the departments of Sinaloa and Sonora, which are divided by the river Fuerte. The population of these two provinces is about 800,000, of whom perhaps 60,000 are Indians. The climate is temperate, and the lands in the interior are fertile, but the principal sources of wealth are the mines of gold and silver; it is said that upwards of two hundred places have been explored and worked, and that these precious metals are met with every where. In these two departments are some considerable cities. The most important are in the province of Sinaloa, *Culiacan*, where reside the governor, bishop, and the prefect of the province &c., population about 10,000,—*Rosario* having a population of possibly 3500, and where the general commanding the forces of Sinaloa and Sonora resides;—in the province of Sonora, *Arispe* was the capital until the year 1839 when in consequence of the incursions of the Apache Indians the seat of government was transferred to the ancient mission of San José de los Ures, 40 leagues to the southward,—population 7000. In this province the port of *Guaymas* concentrates all maritime commerce, but *Hermosillo* is the centre of its trade and riches. Besides these towns there are in these two provinces many large villages or pueblos.

Valle de Banderas Bay.—Beyond and eastward of cape Corrientes, which should be made by all vessels from southward bound to San Blas, is the great bay of Ameca and the Valle de Banderas, 12 or 15 leagues in extent. Here foreign vessels sometimes load brazil-wood, with which the coast abounds.

Marias Islands.—Opposite to and a little south of point Mita, which forms the northern limit of Valle de Banderas bay, are, almost upon the same parallel of latitude, the Marietas (three little islands) and the Corvetena, an islet further to seaward. This group being only about one degree distant from that of the Marias islands, a slight error in latitude might cause them to be taken one for the other; but this error should not occur, if it be remembered that the Marias islands are much larger than the Marietas, and that they all lie on the line of almost N.W. and S.E., while the Marietas and Corvetena are very small and lie almost East and west.

The coast beyond point Mita trends a little eastward, and then runs north-erly to a slight projection, known as point Custodios, the southern limit of the roadstead of San Blas. It contains, after passing point Tecusitan, the anchorages of Chacala and Matanchel.

San Blas.—The roadstead of San Blas is open and exposed. The anchorage is safe in the dry season and less dangerous during the rainy months than that of Mazatlan. The extent and configuration of the roadstead renders an approach to it easy, and when leaving it the prevailing current often affords considerable assistance. It is recommended to avoid remaining in it during the season of the *cordonazos*. The harbour has the great advantage of being a little bay, called *el pozo*, which is closed in and sheltered from the sea by a natural jetty of rocks. In this harbour there is considerable accommodation for careening; it is however to be regretted that there is not room for more than five or six vessels, which should not be of a greater draught than 10 feet or they will be unable to cross the bar.

It is very easy to make San Blas, so many landmarks serve as guides. After having doubled the Marias islands, which are about 60 miles to seaward of the port, a course may be steered for the land, and mount San Juan will be seen to the eastward. This mountain is about 6230 feet high and situated

in lat. $21^{\circ} 26' 15''$, long. $105^{\circ} 0' 54''$ (approximate); behind it is the town of Tepic. When steering for the mountain, the Piedra de Mer or Afuera cannot fail to be recognised as it is an enormous white rock about 150 feet high, and soon after passing it at a short distance on its south side, another white rock will come into view, named Piedra de Tierra or Adentro; this latter is the smaller rock, and exactly marks the anchorage. It is eastward of the Piedra de Tierra where the anchor should be cast, in about $8\frac{1}{2}$ (?) fathoms.

The anchorage may be run for either during day or night. The two Piedras are nearly East and West from each other, distant about 11 miles. All the coast of the bay is quite clear from reefs and the soundings are regular. While under sail it is necessary to take notice of the direction of the current, which runs southward, sometimes with considerable strength.

San Blas is very unhealthy, especially during the rainy season when malignant fevers prevail. There are clouds of mosquitoes and gnats whose stings often cause painful eruptions, ophthalmic complaints, and serious inflammatory disorders;—hence shipmasters should not permit the sailors to sleep on deck, on shore, or in any place where they will be exposed to these disagreeable pests.

Merchandise discharged at San Blas supplies the district of Colima. Some goods are sent to Mazatlan, Durango, San Luis Potosi, and to Zacatecas. The vessels usually return in ballast, but occasionally go either to Mazatlan or Valle de Banderas bay for brazil-wood. If they arrive at San Blas in July, August or September or even later in the year, the cargoes are more easily disposed of than in the earlier months, as they are then forwarded to the fair of San Juan de los Lagos and are privileged with a discount of 53 per cent upon the charges of entry. San Juan de los Lagos is situated upon the road from Mexico to Guadalajara, at 40 leagues from the latter city; it is a small place, but its fair is very important, as it continues 8 days and receives goods not only from Mexican territory but also from Guatemala.

Upon the parallel of San Blas, at rather more than 20 leagues to seaward, are the Marias islands, discovered by Mendoza in 1592. High and uninhabited, these islands have often served as a refuge to pirates, and their position is such that they would be of considerable importance in the event of a hostile force having to blockade the coast of Mexico. Vessels stationed there would also be able to capture vessels from the Sandwich islands, China and California. Tortoises with fine shell are to be obtained here, also game, sponges, wood and excellent water. There is a good passage between the middle and north-western island, and vessels may anchor westward of them in 18 to 20 fathoms.

At 40 miles from San Blas in a north-westerly direction is the little uninhabited island of Isabel. It is immediately opposite the river San Pedro. Vessels may anchor in about 8 fathoms near its north-west point and find shelter from north-easterly winds.*

In lat. $22^{\circ} 25'$ are the small hills of Bayona. The mouth of the river Bayona is known as the river Boca de Teacapan. At 8 leagues further nor'-

* Isabel island is of moderate height, nearly barren, and its herbage and grasses can scarcely be distinguished. Neither wood nor water are to be obtained from it. The beach is lined with rocks, with the exception of a small sandy cove open to westward, where boats may be hauled up on the shore. The island is only frequented by sealers. *Du Petit Thouars* tome 11.

ward are seen the hillocks of Chamatla. The west point of the river Chamatla or Rosario is in lat. $22^{\circ} 50'$, long. $105^{\circ} 58'$ (approximate). It was from the little port at the entrance of this river that Fernando Cortez embarked, April 15th, 1585, when he discovered California; at a mile outside it the depth is 8 and 9 fathoms.

When sailing along this coast, northward from San Blas, several large farms or haciendas are seen, Del Mar, San Andres, Santa Cruz, Teacapan, Del Palmito, &c. Bullocks may be bought from them and also vegetables. The water of all the rivers is good and firewood very abundant.

Seasons, Winds, &c.—The year is divided into the dry and rainy seasons the changes into which take place generally and at variable periods. During the dry season the weather is constantly fine. The winds prevail regularly during the day from N.W. to West, following the direction of the coast and are replaced at night by a light breeze from the land or by a calm.

The rainy season, which commences in June, is at first indicated by calms and slight showers; as the season advances the showers become heavier and more frequent, and instead of prevailing only at night they commence in the afternoon and terminate in very violent tempests accompanied by thunder and lightning and violent winds from all quarters of the horizon. This weather continues till the end of September and it frequently occurs that the season is terminated by a violent hurricane, which usually takes place from the 1st to the 5th of October the period of the fête of Saint Francis. These storms, which always prevail from S.E. to S.W., are of short duration; but their violence is so great, and the sea which accompanies them so high, that nothing can resist their influence;—hence they are known in the country by the term *cordonzos de San Francisco de Asis*.* When overtaken in the roadstead by one of these storms the anchor should be immediately raised, or the cables cut, and the vessel run ashore (*sic*). At the approach of the *cordonazo* the offing should be run for, or if obliged to anchor in the roadstead it should be at such a distance from the land that it will be easy to get away on the first intimations of its commencement. These observations are not applicable to roadsteads entirely open, for such should be avoided during the months of September and October. Occasionally the *cordonazo*, contrary to the experience of seamen, occurs later than St. Francis' day; for instance, on November 1st, 1839, twelve vessels supposing the season to have passed, were surprised in the port of Mazatlan and were almost entirely destroyed. On November 1st, 1840, three vessels, under a similar error, were lost in the roadstead of San Blas, and several people were drowned, without it being possible to render them any assistance.

Although this coast is within the region of the N.E. trade, yet, such is its configuration that a S.W. wind occupies its place in the gulf of California; it is not however felt on the coast northward of lat. 23° .

Mazatlan.—Mazatlan is distant from San Blas about 120 miles; the navigation between is very easy and usually occupies 2 to 5 days. The intermediate coast is everywhere safe, and has off it at a moderate distance a depth of 6 to $7\frac{1}{2}$ fathoms, and at some miles in the offing 38 to 55 fathoms.

The roadstead of Mazatlan, like that of San Blas, is open and exposed, although in the dry season a vessel may anchor in it in security and find

* *Cordonazo*—Spanish—Stroke with a cord or rope.

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protection from the prevailing winds, which are then always from N.W. and from seaward. During the rainy season, the port is extremely perilous; if at this period a vessel be driven on shore, it would in all probability become a total loss, for the coast is strewn with rocks against which the sea breaks with violence.

The roadstead of Mazatlan, in the province of Sinaloa, is quite open to the most dangerous winds that prevail in the rainy season. The port is formed by a hollow in the land; in the midst of it is the town, which can be approached only by vessels of the lightest draught. Large vessels anchor south of the town, and are sheltered on the west side by Crestin, a small but very lofty islet on the north-west side of the roadstead; this islet is separated from an islet north of it by a channel only a few fathoms wide, and this last islet is itself only a cable's length from the land. When approaching the port directly from seaward, the object of recognition is Crestin islet, which appears isolated; to the north-westward of it are two islets named Venado and Pajaros, which are also useful marks when steering in for the coast, as it is only on this part of the coast that islets exist.

The anchorage at Mazatlan at present resorted to is southward of Crestin island, but the islets just mentioned form with the coast a roadstead which in former days was much frequented by Spanish vessels and which is certainly to be preferred during the rainy season. In this latter roadstead, there is shelter from southward and south-westward and the vessel, if need be, can get to sea either through the channel between the islands or between them and the coast; but as during the dry season the prevailing north-westerly winds are there very much felt, and the heavy seas they raise break on the beach with great violence, the discharge of cargo is rendered so difficult and dangerous that vessels now prefer the roadstead southward of Crestin where these inconveniences are not experienced.

The port of Mazatlan has been opened to foreign commerce for some years; the official name applied to it by the Mexican government is *La villa de los Costillas*. Its population amounts to about 15,000 during the rainy season, but is much larger during the dry season or the period when foreign vessels arrive, for at that time the merchants of the provinces of Chihuahua, Sonora, Colima, Sinaloa and Durango, resort to it to make their purchases. The trade is almost entirely in the hands of foreigners who realise considerable profits.

The town of Mazatlan is open on all sides, having neither fortifications nor batteries, a few indifferently equipped soldiers forming the entire garrison.

Ships ought to get their water in the peninsula which forms the south side of the road; everywhere else it is brackish. Although Mazatlan is less unhealthy than San Blas, severe fevers are common during the rainy season, and as there is no hospital in the town, shipmasters should be strict in not allowing their men to run into any excesses, which might be followed by dangerous consequences.

Mazatlan is the only port in this part of America, north of Guayaquil, where a ship can procure a complete supply of provisions. A bullock costs 8 or 12 piastres. Flour from Guaymas, which is excellent, is from 12 to 14 piastres for 12 arrobas (305 lb English). Sail-cloth, pitch, tar, cordage, chains, anchors, and timber (partly from wrecks) may be procured in the stores, (1840)

At 10 leagues eastward of the port, on the road leading to San Blas and Tepic, and 8 leagues from the sea, is the old Presidio of Mazatlan. This

village is now scarcely more than a ruin; for since the removal of the trade to the port, it has lost all its military importance. There are no vestiges of the old fortifications, and the fine barracks built by the Spaniards only serve now to shelter a few cavalry soldiers; the population is about 500. The Rio de Mazatlan, which runs near the presidio, and falls into the harbour, is not navigable.

The Coast.—In no part of the many miles of coast between Mazatlan and Guaymas is there a town. At a short distance from the beach there is a depth of 7 to 8 fathoms, and at 15 to 20 miles from it 44 to 55 fathoms. There are no shoals nor any reefs, at least if such there be they are unknown. The principal rivers, sailing northward, are the Piastra, having at its entrance the little anchorage of Navachista; the Tavala; the Culiacan, with a small port named Altata (the sea in front of this river is so shallow that large vessels ought to give the entrance an offing of 5 or 6 miles); the Tamasula; the Macapule; the Sinaloa,—to the north-westward of which is point San Ignacio whence a reef extends seaward about 8 miles,—it has been stated that in the mouth of this river is a depth of 7 fathoms, and that vessels may there find shelter from north-easterly winds. North of point San Ignacio is the river Santa Maria de Aome. It is said that at the river Fuerte, it is necessary when anchoring to get a mile north or south of the entrance to obtain a depth of 5 to 6½ fathoms. At 15 miles north-westward of the river Mayo, vessels sometimes anchor in 7 fathoms: and, beyond this, near the land, is the little deserted island of Lobos Maminos. In the vicinity of Guaymas is the river Yaqui, the banks of which are inhabited by an Indian tribe of the same name.

Although none of the rivers, just mentioned, are navigable, their entrances will receive coasters, which bring merchandise from Mazatlan, Guaymas and sometimes even from San Blas. The goods are carried thence on the backs of mules to Culiacan, Villa Feliz de Tamasula, Sinaloa, Villa del Fuerte and Alamos.

Guaymas.—The port of Guaymas may be recognised from the offing by a mountain surmounted by two peaks which are supposed to resemble the teats of a goat; hence the mountain is named by the Mexicans Las Tetas de Cabra. When this is distinguished, run along the coast, leaving it a little to port, and Pajaros island, on the east side of the entrance will soon be seen; steer now so as to leave this island to starboard, and you will pass through the channel which it forms with the shore and soon gain sight of the town and port of Guaymas. It is necessary to pass westward of Pajaros island because a bank runs from it northward to the shore. The entrance of the harbour once doubled, two islands are seen in the inner part of the bay, and the passage is between these to reach the anchorage, near or off the land, according to the vessel's draught of water. Vessels under 100 tons make fast to the landing place, and those drawing 12 to 15 feet anchor a ¼ of a mile off, in 3 or 4 fathoms. Corvettes, and frigates, ought to cast anchor outside these islands in 6 or 7 fathoms. This harbour, which would hold a considerable number of vessels, is very safe in all seasons; the bottom is good holding ground, and it is sheltered from all winds, and forms a large basin, strewn with islands, which prevent any heavy swell reaching it. The bank in front of the entrance is the only danger to shipping but it is easily avoided with leading winds, by keeping along the land. A vessel obliged to beat in, must be careful not to touch this shoal.

The town of Guaymas has usually about 5000 inhabitants during the fine season,—during the rainy season about 2000 return to the small towns in the

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interior. The port possesses neither fortifications nor garrison. There are numerous military and naval officers residing in this town, but as for the vessels of the latter they exist only on paper.

The low price and excellent quality of the flour at Guaymas offer considerable advantages to shipping requiring such. The merchants export the flour to Mazatlan, San Blas, Loreto, and La Paz. Bullocks are sold for about 12 piastres. Vegetables are very scarce and dear, and the water in the harbour is so bad that it is usual to send boats for it to the river Yaqui about 12 miles eastward of the port.

Guaymas is surrounded by high mountains, hence the heat is very great in the rainy season. The same fevers prevail here as at San Blas and Mazatlan.

The Coast.—Following the coast of Sonora northward from Guaymas there is at about 4 leagues from that port an excellent harbour known as puerto Escondido; and, there are also off this coast some islands which bear the names of San Pedro Nolasco, Tortuga, San Pedro Martir, and in about lat. 29° that of Tiburon. The last mentioned island is inhabited by the Seris tribe of Indians, who have some huts on the main land; it is 10 leagues long, and is the only island in the gulf which is inhabited. The channel eastward of the island, between it and the shore, is narrow and dangerous, and is fronted at its northern end by Patos island.

All this part of the province of Sonora is barren and inhabited only by some miserable Tepocas Indians. In the interior is the little mission of Caborca, on the banks of a small river at about 22 leagues from the coast, and situated in about lat. 31°. North of the river Concepcion de Caborca is the bay of Santa Sabina and the islet Santa Inez, the river Santa Clara and the watering place (*aguade*) of Los tres Ojitos (the three small eyes). As far as the river Colorado the coast is very low and barren, and the wind continually raises from it clouds of very fine sand.

River Colorado.—This river, now in United States territory—except near the mouth—rises on the western slopes of the Sweetwater mountains and the Sierra de las Grullas, between latitudes 40° and 44°. Its length from the upper sources of its tributaries is about 1000 miles,—the country in its vicinity being inhabited chiefly by Indians. It has but little depth, especially in the dry season; its banks, also, are so low that after heavy rains and the melting of the snow on the hills at its sources its waters overflow and inundate the flat country through which it passes. Its mouth, at the head of the gulf, is nearly 6 miles wide and divided into three channels by two small islands, named Islas de los Tres Reyes. The tide rises here 20 or 25 feet and causes very strong currents, which run sometimes 12 or 15 miles an hour. The entrance is so shallow that it is necessary to run moderately close to the coast of California to find the channel, which is only 5 or 6 feet deep, narrow and dangerous. Within the river are many banks dry at low tide.

At about 8 leagues from its entrance the Colorado receives the Rio Gila, which falls into it from the eastward, after it is increased in volume by the Rio de la Ascencion, formed again by the junction of the Rios Verde and Salado. All these rivers rise in the branches of the Sierra Madre, have but little depth, and during the rainy season overflow their banks. The country in their vicinity is very fertile, and furnishes abundant evidence of the existence of gold; it is inhabited by Yumas, Axuas, Cocomaricopas, Apaches and other Indian tribes, in number about 20,000.

The missions in this part of the country have been almost destroyed. At about 20 leagues from the river Colorado is the mission of Santa Catalina, which is the most northern of those in Lower California; it is distant about 6 days journey from port San Diego on the Pacific ocean.

The Coast.—When descending the western side of the gulf, from North to South, we pass the marshes which extend to cape San Buenaventura, the watering places of San Felipe de Jesus, San Fermin, Santa Ysabel, La Visitacion, San Estanislao, the bay of San Luis de Gonzaga, [San Juan y San Pablo, Los Remedios, the bay of Los Angeles, San Rafael, capes San Miguel and San Juan Bautista, the islet of San Barnabé, cape Trinidad, Santa Anna islet, and the cape of Las Virgenes, which is the last extinct volcano in Lower California, and which according to the Jesuits, was still in activity in 1746. There is much sulphur in the neighbourhood of the crater of this volcano.

Upon the parallel of the volcano of cape Las Virgenes, at 5 and 8 leagues in the interior, are the missions of Santa Magdalena and Nuestra Señora de Guadalupe.

In lat. 29° is the island of Angel de la Guardia, which is long and narrow, and forms with the coast the canal de Ballenas, where a great number of whales have been met with. Opposite the island, at 9 leagues from the shore, is the mission of San Francisco de Borja. To the southward, the islands of Sal si Puedes (get out if you can), Las Animas, and San Lorenzo, present a very dangerous passage. Southward of cape Las Virgenes are seen the bay of Santa Agueda, Galapagos island, the cape and island of San Marcos, which, with the Tortuguillas islands and cape San Miguel, form the bay of Mulege.

Opposite the island of San Marcos, but at 6 leagues inland, there still exists the mission of San Ignacio. That of Santa Rosalia lies $\frac{1}{2}$ a league from the sea, on the banks of the Rio Mulege. This point is easy to be found;—in approaching it from seaward a small hill will be seen, called the Sombrerito, from having the form of a hat. The bay is shallow, and boats of only 15 or 20 tons can enter it. Some pearls are found there, and on the banks of the river some fruits and grain are, or have been grown.

From Mulege bay to Loreto there is always, near the land, a depth of from 20 to 30 fathoms, and the coast contains several good anchorages; the points of Concepcion, Santa Teresa, Colorado, those of Pulpito, San Juan, the bay of that name, that of Mercenarios, Point Maglares, and San Bruno cove.

At 8 leagues northward of Loreto the little island of Coronados offers shelter from the north-eastward. Near the beach of the mission there is a depth of 4 fathoms, and under the lee of the island of Carmen 13 to 16 fathoms.

The anchorage at Loreto is indicated by the church and a clump of palm trees, and it may be distinguished at a distance by a very lofty peak, surrounded by smaller hills. This mountain, called El Cerro de la Giganta, is the highest in Lower California. Its height above the sea level is 4554 feet, according to trigonometrical measurement; it is of volcanic formation as is the rest of the chain that runs through the peninsula.

The anchorage of Loreto is exposed to winds from North, N.W., and S.W. When they blow very strongly it is recommended to get under way to escape being driven on shore. If the vessel be of light draught she may make for Puerto Escondido, 14 leagues to the southward.

The mission of Real de Loreto, opposite Carmen island, was the capital of Lower California but now has only about 200 inhabitants; it is so much

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decayed that the authorities have been transferred to the Real de San Antonio. The presidio, the mission, and the church, are in ruins. These buildings, very substantially built by the Jesuits, were intended to serve, in case of attack, as an asylum to the inhabitants. They are surrounded by a thick wall, which turns the waters of a torrent that descends from the mountains; and which, several times, washed away the houses and the vegetable earth. The presidio was defended by some small bronze artillery, which was never used. The church, for a long time after its decay, contained many pictures, silver vessels, and dedicated jewels of considerable value, which, though left quite exposed, were considered safe from spoliation. At Loreto there are some gardens, but water is generally scarce; and that from the wells is brackish and unwholesome.

At 15 leagues in the interior, westward of Loreto, are the missions of San José de Comandu and San Francisco Xavier.

Under the Spanish government a courier left Guaymas every month, and went to Loreto, whence the letters were despatched to the different missions; but this is long since abolished, and now one may be a whole year in Mexico, without news from California.

Southward of Carmen island are the Danzantes islands, the Pearl banks, the Galeras islands, Catalana, (8 leagues in length), Monserrate, &c. The only points visited by shipping are the harbours of La Paz and San José del Cabo.

La Paz, (where Cortez landed, May 8rd 1535,) is in lat. $24^{\circ} 10'$, long. $110^{\circ} 18'$ (approximate). Vessels anchor in Pichilique bay, eastward of the island of San Juan Nepomezcino, in from 5 to 9 fathoms, and at 2 leagues' distance from the houses, passing at equal distances from the island of Espiritu Santo and point San Lorenzo; only small vessels can approach near to the houses. The population of La Paz consists of about 500 people, the greater part descended from foreign seamen. This is the most commercial port of Lower California. Vessels from San Blas, Mazatlan, and Guaymas, often come to purchase shell at from 16 to 18 piastres the quintal, and mother-of-pearl shells at 6 piastres the hundred-weight.

At La Paz, the Rio Yaqui, and Guaymas, eight or 10 small vessels, of 20 to 40 tons each, are fitted out for the pearl fishing. The divers are all Yaqui Indians, who often descend to a depth of 10 or 12 fathoms. The fishing begins in May, and ends in October. The principal pearl banks in the gulf are in the bay of La Paz, near Loreto, the S.W. point of Carmen island, Puerto Escondido, Los Coronados, Los Danzantes, San Bruno, and San Marcos islands.

After having doubled cape San Lucas, and proceeding along the coast, at a short league from it, the missions of Todos Los Santos soon comes into view; this still contains a few Indians. There is an anchorage, with a small rivulet where water can be procured, and we believe also that provisions can be had from the mission.

At the parallel of 24° , the mountains form a promontory, surmounted by three peaks, the truncated summits of which resembles tables, and which are, from this reason, called Las Mesas de Narvaez.

From this point the coast runs nearly N.E. to the large island of Santa Margarita, on the south side of the entrance to the extensive bay of La Magdalena."

The foregoing observations written many years ago having been found erroneous as regards the population, corrections have been made according to the census of 1865.

The following information upon various ports in the gulf of California, by Lieut. L. Détrouat, appeared in the *Annales Hydrographiques*, volume for 1867, during the progress of our work through the press.

"**Piastla River** in about lat. $24^{\circ} 10'$, long. $107^{\circ} 15'$, is an open roadstead. Vessels anchor in $7\frac{1}{2}$ fathoms at about $\frac{3}{4}$ of a mile from the coast, but those of very light draught of water and coasters may approach nearer until they get into 18 feet at 2 cables' length from the shore. The landing is moderately good. Some Indian huts are on the beach.

Drinkable water may be obtained at a short distance from the beach from a lagoon which is dry during the months between March and June; two wells sunk on its bank serve for cisterns or reservoirs. Good water may also be procured from the river Piastla.

At about a league from the landing place is a plain where about 400 mules or horses can find support for a few days. Cattle can be obtained from this plain and from the woods surrounding it. Forage, carts, draught-horses, &c. &c. can be obtained from the *rancho* of Estancia del Potrero, 8 leagues from Barras, near the river Piastla and on the road to Durangito.

Boca Tavala or San Lorenzo in about lat. $24^{\circ} 32'$, long. $107^{\circ} 45'$. The roadstead is at about $\frac{3}{4}$ of a mile from the entrance to the river; vessels may also anchor in $7\frac{1}{2}$ fathoms at about 40 feet from the entrance. The bar can be crossed only by small coasting vessels drawing 5 feet. The distance from the mouth of the river to the village of Quila is 17 miles, and from Quila to Culiacan 87 miles.

Altata,—approximate position lat. $24^{\circ} 40'$, long. $107^{\circ} 55'$. The north entrance is completely closed by shoals, the south entrance is consequently the only channel that can be used. Anchorage is obtained in the *estero* or creek of Altata (known also as the creek of Robalar), in $8\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, opposite to and near the village of Salina. There is but a poor supply of drinkable water, and provisions are scarce. Cattle can be procured from the *rancho* of Tule, at 6 miles from the landing place.

There is a good road from Altata and also from Salina to Culiacan; it runs along the river Culiacan which falls into the *estero* of Altata. On both banks are Indian villages, the inhabitants of which cultivate maize, beans, &c. The distance from Altata to Culiacan is 96 miles. Provisions and various means of conveyance can be obtained at Altata.

Culiacan is only second in importance to Mazatlan. It was founded in 1584, thirteen years after the taking of Mexico by Cortez. In 1858 the town was pillaged, since when its importance has greatly diminished, so that it contains now only about 8000 inhabitants. If a time of tranquility were to return it would soon regain prosperity, its geographical positions being excellent. It stands on the left side of the river at its confluence with the Humaya. Its commerce is chiefly in dye woods, cotton, and maize.

Playa Colorado.—Vessels which come here for brazil-wood anchor in $6\frac{1}{2}$ fathoms at the head of the banks of the channel to the *esteros* of Caiwan and Playa Colorado.

* Playa Colorado is not mentioned on the Admiralty chart of the gulf.

The north-west bank is to seaward of the others, and extends out about 2 miles. The depth of the channel is $9\frac{1}{2}$ feet, hence it is only vessels of very light draught that can ascend it so far as the *rancho* of Bella Vista, 4 or 5 miles from the entrance. It is from this *rancho* that the wood is exported.

There is a carriage road from Bella Vista to Mocorito the chief town of the district of the same name, and also to the *rancho* of Cienega. The goods which are sent from Mazatlan to Chihuahua pass through Mocorito, Bacubirite and San Jose de Garcia; this route is preferred to the old road, which was through Navachiste. The distance from Bella Vista to Cienega is 28 miles, to Mocorito 27 miles.

Navachiste.*—The anchorage is at about a mile from the entrance in $6\frac{1}{2}$ to $7\frac{1}{2}$ fathoms. The channel, between two islands and some banks, is 8 to 10 feet deep. The custom-house is at Sinaloa, to which place goods are sent either on the backs of mules or in carts. Moderately good water may be obtained here from Macapule islet, the islet on the south side of the entrance, but it is necessary to sink wells for it in the sand.

The *rancho* of Chino is at 7 miles from the entrance, upon the right bank of the river Sinaloa. The distance from the *rancho* of Chino to Sinaloa is 48 miles, and to Fuerte 112 miles, along roads that can be traversed by carts.

Tobolampo Bay or Estero de la Piedad.†—A large and well sheltered bay, but with a narrow and difficult entrance, the channel being between shoals; the depth of the channel is $9\frac{1}{2}$ fathoms. This bay is rarely visited except by vessels of the British Navy for the purpose of delivering specie, a remark which also applies to the Boca Tavala, already mentioned.

The distance from Tobolampo to Sinaloa is 70 miles, and to Fuerte 86 miles; the roads between are but little frequented.

River Ahome in lat. $27^{\circ} 2'$, long. $109^{\circ} 52'$ (approximate position.) The anchorage is at about $\frac{1}{2}$ a mile from the entrance, in $6\frac{1}{2}$ fathoms. The bar can be crossed only by vessels of a less draught than 9 feet. The village of Ahomé is at about 8 miles from the sea, and from this village there is a road along the left bank of the river to Fuerte, a distance of about 80 miles. Provisions of various kinds are abundant.

Agiabampo.—This was hitherto the port of Alamos and of Fuerte, but it is now inaccessible except to coasters of very light draught of water. The approach is through a narrow and difficult channel between shoals, and has a depth of 6 feet as far as the anchorage; it is necessary afterwards to ascend an *estero*.

The distance from the landing place of Agiabampo to Alamos is 45 miles, and to Fuerte 47 miles, along carriage roads.

Santa Barbara situated near the entrance to the river Mayo, the approximate position of which is lat. $27^{\circ} 8'$, long. $110^{\circ} 15'$, is now ~~two~~ part of Alamos. The anchorage is in $2\frac{1}{2}$ to $3\frac{1}{2}$ fathoms at about $1\frac{1}{2}$ cables' length from the coast. The approach is easy excepting when it blows from the S.W., which is very seldom and rarely continues long. Provisions are abundant.

The distance from Santa Barbara to Alamos is 82 miles, along a carriage road.

* Not mentioned in the Admiralty chart of the Gulf. We believe its entrance to be in about lat. $26^{\circ} 27'$, long. $108^{\circ} 50'$.

† This is not mentioned in the Admiralty chart of the Gulf.

River Yaqui or Viejo, approximate position of the entrance, lat. 27° 48', long. 110° 38'. The channel in is only sufficiently deep to admit vessels drawing less than 6 feet, it can consequently be used only by the smallest coasters.

The road from Alamos to Guaymas, by the coast, passes by the eight villages of Yaqui upon the right bank of the river. All the country watered by the rivers Yaqui and Mayo, is exclusively inhabited by Indians.

GUAYMAS.—This port, although small, is one of the best on the coast of the Pacific. It is perfectly sheltered from all winds, and is sufficiently deep to accommodate frigates. Vessels of light draught can approach the mole, which is in a bad state, and if the water in front of this were dredged so as to increase the depth 5 to 10 feet, almost all commercial vessels could get to it.

General Remarks.—It is the opinion of seamen well conversant with the coast, that at all the places mentioned in the foregoing remarks, troops, cattle, provisions and materials can be either landed or taken on board almost throughout the year. It is sometimes necessary to erect stages to establish a communication with the land, which will cause a delay of some hours. None of these places should be visited without a pilot.

The prevailing winds from November to May are from the N.W. From May to July, calms and soft sudden breezes prevail. From July to October, light winds from the S.E. are felt in the morning, and these gradually veer to the N.W. quarter in the afternoon;—in this season, sudden gusts of but little strength are often experienced from East, S.E. and South, which continue about 18 hours and rarely exceed 48 hours.

At certain distant intervals of time a local hurricane or cyclone of very limited radius occurs on this coast. It is known under the name of *cordónazo*.

The seas upon the coast are stronger, as might be expected, during the rainy season. In June and July tide races (*raz de marée*) occur.

The coast between Altata and Guaymas should be approached only with the greatest precaution on account of the shifting shoals which extend some distance from the land; the currents also are variable and sometimes prevail with considerable strength."

RUSSIAN-AMERICAN TRADING POSTS.

The Department of State, Washington, U.S., has recently (October 16th, 1867) printed for circulation the following "Notes on the Russian-American Trading Posts" by Lieut. James Black, Secretary to the Marine Western Union Telegraph Expedition:—

The Russian-American Company has the following trading posts:

1. Sitka, or New Arkhangel. 2. Fort Constantine. 3. Fort St. Nicholas.
4. Kodiak island, five posts. 5. Roobets, Afgonak island. 6. Ounamok.
7. Katmy. 8. Delorav, Ounga island. 9. Ounalaska, Elulook harbour.
10. Atka. 11. Atton. 12. Copper. 13. Behring. 14. St. Paul. 15. St. George.
16. Fort Alexandrovski. 17. Fort Michaelovski. 18. Shumshu.
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1. Sitka, or New Arkhangel, is the residence of the Governor of the Russian colonies of America, and chief depot of the Russian-American Company. It has a population of from 600 to 700; there is a railway that is capable of taking up a vessel say of 400 tons, an iron and brass foundry, a machine shop, and other conveniences for making repairs on vessels. A sawmill is situated within the town, which turns out a small supply of lumber; there is, however, a mill of greater power a few miles from town, where can be manufactured a large amount, if needed, whence it can be transported by water to Sitka.

In the storehouses (or magazines) can usually be found cordage, canvas, and many of the most needful articles for ships' use.

The harbour is excellent, and is fronted to the west by almost innumerable islands, and comparatively quite easy and safe to enter or depart from.

Wood, salmon and water can be obtained in any desired quantity, and, in extreme necessity, quite extensive repairs could be made to a sailing vessel or steamer.

2. Fort Constantine is situated on the south-west side of Thargalouk island, and on the north shore of Noockuk, lat. $60^{\circ} 20' 18''$ N., long. $146^{\circ} 52' 50''$ W. The anchorage is in a small cove to the northward and eastward of the post, distant some 2 miles; depth of water varying from 5 to 10 fathoms, and is free from all hidden dangers; the shores are lined with a thick growth of trees of the fir and hemlock species; no Indians inhabit the island, but they resort to this post from the interior and from along the coast north and south to barter their furs. The island, called by the Russians "Sooklu" and by the English "Montague," is inhabited by about 400 natives, who also come to this post to trade during the months of April and May. The Indians inhabiting the Copper river country to the east of the fort do not come until July, as the river is not clear of ice nor free from heavy freshets before that time.

Abundance of wood and water can be obtained, but no other supplies for a ship.

3. Fort St. Nicholas is near the head of Cook inlet, at the east side, near the mouth of the Kakanon river, in lat. $60^{\circ} 32' N.$, long. $151^{\circ} 19' 15'' W.$ The tide at full and change of the moon rises from 50 to 80 feet. At the mouth of the Kakanon a vessel drawing 12 feet has ascended the river as far as the fort.

The company has at this place eight or ten men, including the commander and priest.

The surrounding country is sparsely wooded with a stinted growth of birch and other varieties of hard wood; the soil, however, is said to be good; in many places potatoes are raised in quantities that exceed the wants of the people at the post, and are at such times exported to Sitka, when a company's vessel visits them at a suitable season of the year for that purpose. The post is said to be of much importance as a trading post; large supplies of choice furs are obtained annually from the surrounding country.

A vessel can lie at anchor in Cook inlet, off the river, in the summer season, and boats can safely enter the mouth, as it is usually quite smooth.

4. Kodiak Island.—There are five trading posts on Kodiak, two on the south-east side; the southernmost, named "Three Saints," lies in lat. $57^{\circ} 8' N.$, long. $158^{\circ} 26' W.$ This post is now nearly deserted, the company having found a better location at a place called by the same name 8 miles to

the north-east of Sathludak straits. Both places are fine anchorages, the depth of water varying from 5 to 8 fathoms, muddy bottom. Abundance of salmon, dried or salted, may be obtained at this post, and excellent water can be had from a small river 2 miles to the south-west. The best place, however, to obtain a large supply of water would be at the first harbour, as a ship may be anchored within $\frac{1}{2}$ of a mile of the mouth of the river close to the old houses.

The third trading post is on the south side of Egink bay, lat. $57^{\circ} 26' N.$, long. $152^{\circ} 36' W.$ As to supplies for a ship the same may be said as of the others. The anchorage is open to the south-east, with a depth of 10 fathoms, sandy bottom, $\frac{1}{2}$ a mile from the shore.

The fourth trading post is on the west side of the island, in Aliaska strait, named Karlouk, in lat. $57^{\circ} 36' N.$, long. $154^{\circ} 27' W.$ The surrounding country at each of the four different posts is destitute of wood, or nearly so. There is no anchorage at Karlouk; the company's ships stop at a roadstead on the west side of the bay of Oouiak, near an island; the anchorage is in 5 fathoms, sandy bottom, 2 cables length from shore.

The fifth and principal trading post on the island is St. Paul's, on the north-east side, in lat. $57^{\circ} 47' 30'' N.$, long. $152^{\circ} 20' 30'' W.$ The tide rises, on the full and change, 12 feet; high water 11h., 47m. A.M. The harbour is excellent, being situated between the main island and the small island of Bleeshnee; the depth of water varies from 5 to 7 fathoms, sandy bottom. The only objection is its limited extent, as only three or four vessels could well be accommodated to ride at anchor with a long scope of cable. Large collections of furs are made at this post. Nearly all the ice consumed in California comes from Kodiak, or rather, from a small island called Lasnoy or Wood island, lying to the eastward of this post. About 1 mile distant, on the west side of the last-named island, are two small lakes, from which the ice is taken and stored in houses erected near by for this purpose. The village at the post of St. Paul's contains about 800 inhabitants of all castes. They have a church, with priests and deacons, as is usual in the worship of the Greek church.

5. Roobets, on Afgonak island, situated on its south side, lat. $58^{\circ} N.$, long. $152^{\circ} 42' W.$ There is no anchorage in this place, and many sunken rocks line the adjacent shores. Four of the company's men are stationed here to purchase skins (principally of the fox), and also to catch and dry salmon; for the last-named purpose natives are employed at one rouble a day (equal to 20 cents in United States coin). The inhabitants number about 100 of mixed blood, *i. e.*, Russians, Aleutians and Kodiaks. They have a few cattle for domestic use, principally milch cows. 800 or 400 barrels of potatoes are annually exported to Sitka by the way of Kodiak. The potatoes are cultivated by the natives and by them transported in canoes to Kodiak.

6. Ounamok.—This post is named after the island on which it is situated, and is in lat. $55^{\circ} 50' N.$, long. $155^{\circ} 30' W.$ Its south-west end is moderately high. From the middle to the north-east it is much lower. The anchorage is in a small bay on its west side, near the south end. The island is 10 miles in length by 6 miles in breadth; a rocky islet lies off the north-west side, and several rocks awash and below the surface lie along to the north-eastward, distant from the beach 1 mile. The inhabitants number about 50, half of whom are women and children. One of the Russian-American Company's men resides on the island and acts as a kind of sub-chief, and superintends the collection of furs, &c.

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7. Katmy.—This post is located in lat. 58° 8' N., long. 154° 50' W, on the north side of Aliaska strait. The ships' anchorage, however, is to the north-east 10 miles, lat. 58° 6' N, long. 154° 31' W. Ten or fifteen of the company's people live on this island; they trap fox and hunt sea otter.

8. Delorav.—This post is located on the south-east side of Ounga. The anchorage is in lat. 55° 10' N., long. 160° 27' W., in a small bay open to the east and south-east, with a depth of from 4 to 6 fathoms. The village contains about 100 inhabitants. Four or five of the company's men are stationed here. The distance from the anchorag (Coal harbour) to the village is about 20 miles. Sea otter is the principal fur obtained.

9. Ounalaska, on the north-east side of Ounalaska island, and at the head of the bay of Elulook, lat. 58° 52' N., long. 166° 25' W. The village surrounding it has from 100 to 125 inhabitants. The object of the company in establishing a post at this point was on account of the good harbour, which is sheltered from all winds, with a depth of 18 to 20 fathoms, sand and muddy bottom.

Sea otter and fox are found in large numbers. Fresh beef can be obtained here; there is also an excellent watering place, and in September and October a small supply of potatoes can be had.

10. Atka.—On the east side of Atka island is the bay of Norzan, in lat. 52° 10' 30" N., long. 174° 00' 30" W. On the south-west side of this bay is a small but secure harbour, protected from the eastward by a cluster of islands, making it perfectly sheltered from all winds. There is room for two or three ships to swing at their anchors with a full scope of chain. A small village lies on the west shore, which perhaps 50 people residing there.

The company has some half dozen men at this post to collect the skins of the sea-otter and fox. Water can be obtained here; also a limited supply of fresh beef and potatoes.

11. Attou.—The trading post of this island is on the border of the bay of Chichargov, situated on the north-east side of the island, in lat. 52° 56' N., long. 178° 18' E. The inhabitants number about 100. Sea-otter and fox are the principal skins obtained.

12. Copper island has a village on its north-east side, where 20 or 30 individuals of all classes reside. A species of fox is obtained here, but its skin is of only moderate value. Fur-seal are also taken on the shores of the island. The inhabitants are the servants of the company. The anchorage is in an open roadstead, in lat. 54° 47' N., long. 167° 41' E.

13. Behring island.—On the west side of Behring island, lat. 55° 12' N., long. 165° 55' E., is an open roadstead, the depth of water at the anchorage varying from 4 to 8 fathoms. Inland from the shore $\frac{1}{2}$ a mile, abreast of the anchorage, is a village containing a population of between 200 and 300 Aleuts and Russians.

14. St. Paul island is of moderate height; east anchorage is in lat. 57° 8' N., long. 170° 10' W.; the west anchorage, lat. 57° 8' 30" N., long. 170° 12' 30" W. Both anchorages are not more than $\frac{1}{2}$ a mile from shore, bottom sandy; depth of water varying from 9 to 15 fathoms. They are merely open roadsteads, but afford good shelter when the wind blows from the land, the water being quite smooth. At this island the company obtains their principal supply of fur seal-skins, amounting usually from 70,000 to 80,000 annually. No supplies can be obtained except water, which is good, and can easily be procured from a small stream at the west side of the anchorage.

15. St. George island.—The anchorage is in lat. 56° 37' N., long. 169° 33' W. The company has a trading post here. St. George and St. Paul together

have a population of about 80. The anchorage is open to the north, but well sheltered from the south-west to the south-east; the bottom, being a smooth flat rock, covered with sand to the depth of 8 or 4 feet, is poor holding-ground. The depth of water varies from 10 to 20 fathoms.

16. Fort Alexandrovski is on the east side of the Nooshagak river, 25 miles from its mouth, in lat. $58^{\circ} 57' N.$, long. $158^{\circ} 18' W.$ The anchorage is 10 miles from the fort, in 4 to 5 fathoms water. The number of the Company's employees at this post is 10 or 12. A large quantity of furs is collected each season,—principally beaver, fox and sable. A stunted growth of fir and pine lines the banks of the river. There are said to be many banks and shoals, which make the navigation of the Nooshagak impracticable without the assistance of an Indian pilot.

17. Fort Michaelovski is near the head of Norton sound, lat. $63^{\circ} 28' N.$, long. $161^{\circ} 52' W.$, on the shore of Tibenkov bay. As a trading post it is, perhaps, of a little more importance than fort Alexandrovski, a large amount of furs of the same kinds being obtained yearly. Tibenkov harbour is shallow, and much exposed to north and north-east winds. No fresh supplies are to be had.

18. Shumshu island.—The trading post is located on the west side of the island (one of the Kuril group) and on the east side of little Kuril strait. The anchorage is on the other side of the strait, however, in lat. $50^{\circ} 41' N.$, long. $156^{\circ} 15' E.$, in a small bay called Otomy by the Russians. Wood and water in abundance can be procured at the anchorage, the distance from which to the village is 3 miles. Some 10 or 12 of the Company's men are stationed here, but few furs are collected.

19. Simusirisland—Broughton bay.—Broughton bay is in lat. $47^{\circ} 9' N.$, long. $151^{\circ} 55' E.$, 2 miles in extent, but is fronted by rock, so that it is only practicable for boat navigation at its entrance. The Company's vessels, when visiting this place, lie off and on, the water being bold close to the shore. It is not of much account as a trading post."

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* Point Remedios...	18	84	80	89	53	11		
* Isalco volcano, 4978 feet	18	47	0	90	45	51		
" "	18	50	18	89	44	26		
Acajutla, flagstaff	18	87	27	89	54	10	7	9
* Mount Apaneca, 5715 feet	18	50	10	89	59	21		
* Morro des los Esclavos, 4829 feet	14	0	80	90	10	51		
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* Pacayo volcano, 6975 feet	14	25	80	90	40	51		
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11. **RIVER THAMES and STRAIT of DOVER**, showing the navigation from Orfordness and London to Beachy Head. With large plans of Harwich, Ramsgate, Folkestone, Dover, Calais, and Boulogne Harbours. On two sheets. Accompanied with a Book of Directions 8s. 0d.
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12. **STRAIT of DOVER**, showing the south-east coast of England from Ramsgate to Beachy Head, and the opposite coast of France from Calais to Boulogne. With plans of Ramsgate, Dover, Folkestone, Calais and Boulogne Harbours. Illustrated by numerous views of the coast. The scale is very large, being 19½ in. to 1° of Longitude. One sheet ... 4s. 0d.
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13. **SCILLY ISLANDS**, on a large scale, and illustrated with some views. Drawn principally from the surveys of Mr. G. Spence. One sheet ... 4s. 0d.
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14. **BRISTOL CHANNEL**, extending from Hartland Point and the Smalls to Bristol and Gloucester. On three sheets. Drawn from the surveys made by Commanders Robinson, R.N., Denham, R.N., Sheringham, R.N., and All-bridge, R.N., accompanied with a Book of Directions ... 10s. 0d.
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15. **IRISH or St. GEORGE'S and BRISTOL CHANNELS**, on a very large scale, extending from Trevoze Head in Cornwall to the Firth of Clyde, with plans of Holyhead Bay, Tuskar Rocks, Lundy Island, South Coast of Man, North Rocks near Belfast, Milford Haven, River Clyde, Belfast Bay, Douglas Bay, and entrances to Loughs Foyle, Strangford, and Carlingford; and illustrated with numerous views of the coast, lighthouses, beacons, &c. On three sheets. Drawn from the surveys of Captains Beechey, Denham, Mudge, Robinson, Williams, Frazer, and Sheringham, &c. &c. accompanied with a Book of Directions ... 12s. 0d.
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16. **IRELAND (The West, South-West, and North Coasts of)**, from Waterford to Lough Foyle, on the same scale as the chart of St. George's Channel, No. 15, preceding; containing plans of the harbours of Waterford, Cork, Valentia, Youghal, Bantry, Bear-Haven, Galway, &c. Newport, Westport, the River Shannon, and the anchorage within the Gola Islands. On three sheets. Compiled from the latest surveys, and illustrated with numerous views of the coast. Accompanied with a Book of Directions. A beautifully engraved and elegant chart ... 10s. 6d.
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17. *** NAVIGATION round IRELAND**, with numerous plans of harbours. With Sailing Directions ... 12s. 0d.
On cloth for Captains' use ... 17s. 0d.
On cloth and rollers for Counting-house, coloured and varnished ... 30s. 0d.
Or it may be had in two parts, thus—
- 17a. **Irish Channel**. With plans of Belfast, North Rocks, Maidens, &c., Tuskar Rocks, Skerries Rocks, &c., Milford Haven, South Coast of Man, and Entrance to Lough Foyle. Accompanied with a Book of Directions ... 7s. 0d.
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- 17b. **West Coast of Ireland**. With plans of Clew Bay, Broadhaven, Killala Bay, Kilbegs, Sligo Harbour, Teelin Harbour, Kinsale, Galway Harbour, Tralee Bay, Valentia Harbour, and Crookhaven. Accompanied with a Book of Directions ... 7s. 0d.
On cloth for Captains' use ... 9s. 6d.

* This publication (No. 17) has hitherto been presented as one chart, but its size being very inconvenient this new publication has been arranged in two charts. An advantage which follows from this is, that we are enabled to give more plans of harbours than hitherto.

18. **APPROACHES to the FIRTH OF CLYDE and NORTH CHANNEL**, on two large sheets, showing the navigation along the north coast of Ireland, and from the Irish Channel to Glasgow and Greenock. Drawn from the late Admiralty surveys, and improved by the introduction of several plans of harbours. On two sheets ... 10s. 0d.
On cloth for Captains' use ... 12s. 6d.
On cloth and rollers for Counting-house, coloured and varnished; size 4 ft. 4 in. by 3 ft. 5 in. ... 24s. 0d.
19. **ENGLAND (East Coast of), from Dungeness to the River Tyne**, with plans on a large scale of the River Humber, Yarmouth Roads, Bridlington Bay, River Tyne, Hartlepool, Sunderland, &c. On four sheets. Illustrated with numerous views of the coast. With a book of Sailing Directions ... 12s. 0d.
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20. **ENGLAND (East Coast of), from Dungeness to Flamborough Head**, with plans of Yarmouth Roads, Bridlington, and the River Humber. On three sheets. With a Book of Directions ... 10s. 6d.
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21. **ENGLAND (East Coast of), from Orfordness to Flamborough Head**, with plans of the River Humber, Yarmouth Roads, and Bridlington Bay, and illustrated with views of the coast. On two sheets. Accompanied with a Book of Directions ... 8s. 0d.
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On cloth and rollers for Counting-house, coloured and varnished; size 4 ft. 4 in. by 3 ft. 5 in. ... 20s. 0d.
- NOTE.*—This chart and the chart of the Estuaries of the Thames, No. 9, will show the navigation from Dover and London to Hull, on a very large scale.
22. **ENGLAND (East Coast of), from Orfordness to Flamborough Head**, delineating Yarmouth Roads, Hasborough Gat, Sheringham Shoals, Blakeney Harbour, the Dudgeons and Dowdings, Lynn Deep and the Humber, with plans of Yarmouth Roads and the River Humber. On one sheet. Drawn from the surveys made by Captains Hewett and Washington, R.N. ... 4s. 0d.
On cloth for Captains' use ... 5s. 3d.
23. **EAST COAST OF ENGLAND, from Orfordness to the River Tyne**, with plans on a large scale of the River Humber, Yarmouth Roads, Bridlington Bay, Sunderland, Whitby, Scarborough, Hartlepool, and the River Tyne. On three sheets. With descriptive notes of the harbours, headlands, &c., and numerous views of the coast. Accompanied by a Book of Sailing Directions. ... 10s. 6d.
On cloth for Captains' use ... 14s. 3d.
On cloth and rollers for Counting-house, coloured and varnished; size 6 ft. 6 in. by 3 ft. 5 in. ... 31s. 6d.
- NOTE.*—This chart, with Nos. 9, 10, or 11, will show the navigation from London or the Downs to Newcastle on a very large scale.
24. **YARMOUTH and LOWESTOFT ROADS.** A small plan chart showing all the leading marks, lights, &c. ... 1s. 0d.
25. **ENGLAND and SCOTLAND (East Coasts of), from Flamborough Head to Cape Wrath and the Orkneys**, with plans of Farn Islands, Sunderland, River Tyne, Cromarty, Pentland Firth, Hartlepool, Scarborough, Whitby,

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27. COAL PORTS of YORKSHIRE, DURHAM, and NORTHUMB-ERLAND, with plans on a large scale of the Rivers Tees and Tyne, the Ports of Sunderland, Hartlepool, Whitby, Scarborough, and Blyth, with Coquet Island Road. One sheet. Drawn from the surveys of Commanders Hewitt, Slater, and Washington, R.N. Illustrated with views of the Lighthouses, &c. &c. ... 5s. 0d.
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28. FIRTHS of FORTH and TAY, on two sheets. It shows the rivers on a very large scale, and contains plans of the Harbours of Leith, Granton, Burntisland, Anstruther, Crail, Pittenweem, Kirkcaldy, Dysart, Buchhaven, Elie, St. Andrew's, Dundee, Arbroath, &c. &c. Accompanied by a Book of Sailing Directions, which contains Coloured Drawings of the Signals used at the various Ports ... 8s. 0d.
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32. SEA NORTH-WEST of the BRITISH ISLANDS, on two large sheets, including plans of the Caledonian Canal and Rockall Bank. This chart is specially adapted to the use of Shipmasters frequenting the Rockall Bank in pursuit of the Fishery, as it shows the Bank on a large scale. Limits; latitudes, 53° 50' and 63° 35' N., longitudes, 0° 30' and 15° 40' W. ... 8s. 0d.
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37. **SOUTHERN PART of the NORTH SEA** from Dungeness to Flamborough Head on the English side, with the opposite coasts of France, Holland, &c., from Calais to Hamburg. With a large plan of the Flemish Banks. On three sheets. Accompanied by a Book of Directions ... 10s. 0d.
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38. **NORTH COAST of HOLLAND**, from the Texel to Hamburg, showing the entrances to the Rivers Elbe, Weser, Ems, Jahde, and Hever. Drawn from the latest surveys, and much improved by the introduction of descriptive notes, &c. &c. On 1½ sheet. Accompanied with a Book of Directions ... 7s. 0d.
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* These are all new charts, engraved in the best and clearest style. They show the navigation from the North Sea to the Gulf of Bothnia or Gulf of Finland on the largest scale yet published.

47. **COAST of NORWAY and WHITE SEA**, on a very large scale. This chart is drawn from the recent Norwegian and Russian Surveys; and shows the navigation from the British Isles to Arkhangel. It contains plans of the vicinity of Hammerfest and Tronsøe, the port of Drontheim, and the bay of Arkhangel, and is illustrated with several views of the coast. On two sheets. Accompanied with a Book of Directions ... 8s. 0d.
On cloth for Captains' use ... 10s. 6d.

48. **WHITE SEA**, on two large sheets. With plans of Arkhangel, Sosnovets, Veshnyak, Nokuev, Sem Islands, Inkinskie and Omega Harbours, the gulf of Omega, &c. Illustrated with numerous views of the coast, and improved by many explanatory notes. Accompanied with a Book of Directions ... 8s. 0d.
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Shipmasters going to Arkhangel should take this chart with Nos. 35 or 36 and 47, as these publications will exhibit the whole voyage to the White Sea.

Atlantic, and Islands of the Azores, &c.

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50. **NORTH ATLANTIC (Chart showing the Currents)**. The same chart as No. 49, but with the currents distinctly shown in colour, and with an additional sheet of plans, consisting of Track, Magnetic, Tidal, and Wind Charts. Accompanied by the pamphlet No. 49a. "Short Notes on the North Atlantic" ... 12s. 0d.
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51. **SOUTH ATLANTIC**, on two large sheets, from the Equator to 65° south latitude, on a very large scale; with plans of the islands of St. Helena, Ascension, Trinidad, Martin Vas, Fernando Noronha, Rocas Reef, &c. Illustrated with some views. Much valuable information on the winds, currents, and temperature of the water is embodied in this chart, and no expense has been spared in producing a good publication ... 8s. 0d.
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- 51a. **SHORT NOTES ON THE SOUTH ATLANTIC**. A small pamphlet containing Sailing Directions and remarks on making Passages across the South Atlantic, price 1s., to accompany this chart.
52. **SOUTH ATLANTIC (Chart showing the Currents)**. The same chart as No. 51, but with the currents distinctly shown in colour, and with an additional sheet of plans, consisting of Track, Magnetic, Tidal and Wind Charts. Accompanied by the pamphlet No. 51a. "Short Notes on the South Atlantic" ... 12s. 0d.
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- NOTE.*—This chart, with the chart of the North Atlantic, No. 50, shows the whole navigation to the Cape of Good Hope and Cape Horn, and will be found very serviceable, as the directions of all the currents are delineated.
53. **AZORES, or WESTERN ISLANDS**, one sheet, on a very large scale; with particular plans of Horta and Pim Bays, Fayal Channel, St. Michael Island, Ponta Delgada, Villa Franca Road, St. Lourenzo Bay, Villa da Porto, Praya, Praya in Terceira, Angra Bay, the Formigas and Dollabarar Shoals, &c. &c., illustrated with numerous views. Drawn principally from the recent survey of Captain Vidal, R.N. A beautifully engraved and cheap chart ... 5s. 0d.
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* Either of these charts with No. 32, will show the navigation from the Faeroe Islands to the Mediterranean.

61. **BRITISH ISLANDS to the MEDITERRANEAN, CANARIES, MADEIRAS, and AZORES.** On two very large sheets, and with plans of harbours. Limits, latitude 26° N. to latitude 56° N.; longitude 0° $40'$ W. to longitude 31° $30'$ W. A very useful chart, specially intended for the orange trade and shipmasters bound to the Mediterranean 8s. 0d.
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On cloth for Captains' use 10s. 6d.

This chart and No. 62 preceding (the Bay of Biscay) show the navigation from the English Channel to the Mediterranean on a large scale.

64. **COASTS of PORTUGAL and SPAIN, from Cape San Vicente to Gibraltar.** On a very large scale. With plans of the principal harbours, Cadiz, the Rivers Odriel, Guadalquivir, &c. This chart is from the most recent surveys, and published specially for the trade to Pomeroy and Seville 5s. 0d.
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65. **MEDITERRANEAN SEA.** Four sheets. On a large scale, with about 30 plans of the harbours, &c., among which are the following:—Malaga, Alicante, Barcelona, Villefranche, Strait of Gibraltar, Cartagena, Genoa, Hyeres Road, Leghorn, Toulon, Cagliari, Algiers, Strait of Bonifacio, Gulf of Naples, Palermo, Strait of Messina, Valetta, Smyrna, River Danube, Alexandria, Cephalaonia, Trieste, Patras, &c. Illustrated with numerous views of the coast, and descriptive notes. Drawn from the late surveys made by order of the British, French, Austrian, and Russian Governments, by Commanders Smyth, Copeland, Graves,

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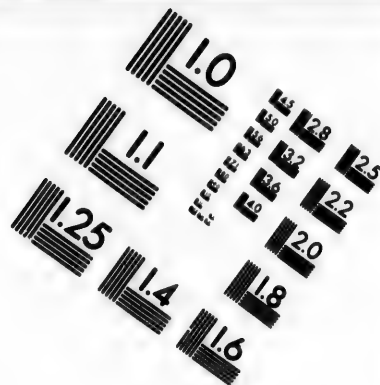
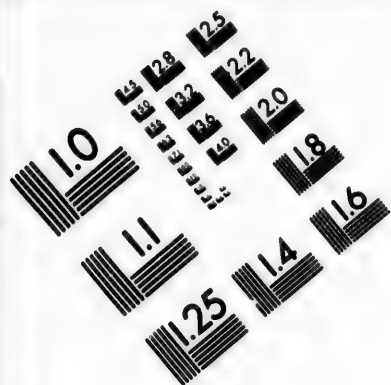
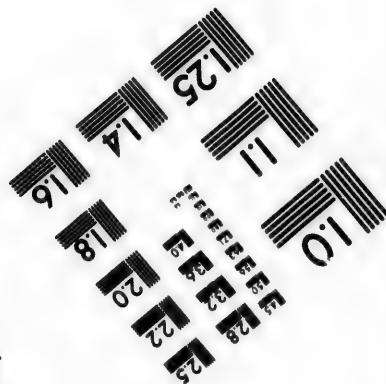
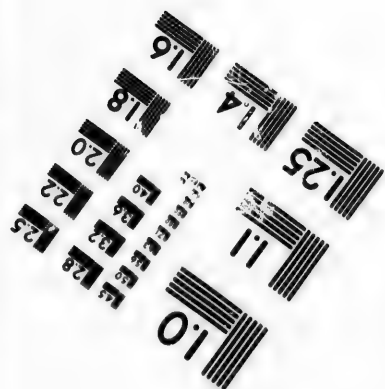
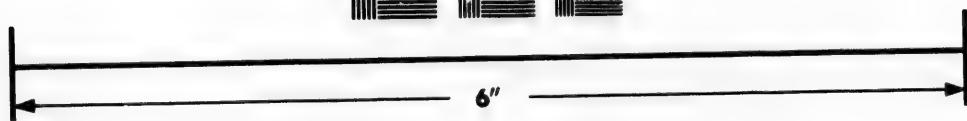
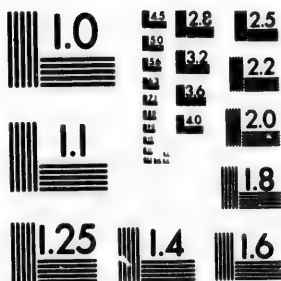


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„ Ebony Handle, Ivory Arc, in Mahogany Case, best	3	15	0
„ Single Observation, Ivory Arc, plain and common	1	15	0
„ „ with Double Tangent	2	5	0
„ „ and Vertical Screws	2	10	0
„ „ and Back Shades	2	18	0
TELESCOPES to any of the above... extra	0	8	0
ARTIFICIAL HORIZONS, with parallel glasses and mercury, complete...	4	4	0

	£	s.	d.
BINNACLES. —Dolphin Pattern, large size, with Lumps and Shade, crown top	£14	14s.	0d., and
" Skylight Pattern, crown top	£4	4s.	0d., and
" Octagon Pattern, wood, £6 6s. 0d., £11 8s. 0d., £9 9s. 0d., and	£6	6s.	0d., and
" Pillar, crown top	£7	7s.	0d., and

N.B.—Binnacles of any pattern made to order.

COMPASSES. —Plain Asimuth, with Sight	3	3	0
" " Asimuth	5	5	0
" Best Prismatic Asimuth, with Sight	6	6	0
With Tripods, £1 5s. extra.			
" Mast Head Compasses, for avoiding the Local Attraction, of any size. With Cylinder Shade and Lamp. Various prices.			
" Amplitude,	£1	0s.	0d. to
" Stand for the above	extra	1	5
" Brass Steering, 9, 10, and 11 in.	from	13s.	to
" Wood ditto	from	6s.	6d. to
" Brass Hanging ditto	from	£1	to
" Every variety of Brass Boat ditto	from	10s.	to
" Wood ditto	from	3s.	3d. to
" Pocket ditto, in brass	from	0	1

BAROMETERS. —Best rosewood, marine, with Sympiesometer and Thermometer	£5	5s.	0d. to
" Best rosewood, with arm and Thermometer, circular front, ivory scales, and rack motion	£2	10s.	0d. to
" Ditto, with round head, and improved tube and cistern, common	2	10	0
" Plain ditto, with Thermometer on the door in front	2	0	0
" Wheel Pattern, various sizes, and mounting, from £1 5s. 0d. to	£1	5s.	0d. to
AFEROID BAROMETERS, do... ..	from	£2	10s.

SYMPIESOMETERS	from	2	2	0
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THERMOMETERS. —8 inches long, with box scale	0	1	6
" 8, 10, 12, and 14 inch Brewers' ditto, in Japan or Copper cases	from	3s.	6d. to
" Night and day, for registering the greatest degree of heat or cold during the absence of the observer, from 12s. 6d. to	12s.	6d.	to
" Marine, in a strong copper case, principally used for taking the soundings, and ascertaining the temperature at the bottom and at the surface of the Sea... ..	from	£1	5s.

TELESCOPES. —One, two, and three draw	from	£1	0s.
" Of superior quality, large object-glasses... ..	£2	0s.	0d. to

DOUBLE GLASSES, especially adapted to the use of captains and pilots, &c., at night	£2	2s.	0d. to
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LOG GLASSES, 14 and 28 seconds, common	each	0	1	6
" In brass frame	0	2	6	
" Half-hour solid Glasses	0	2	6	
" One-hour ditto	0	4	6	
" Two-hours ditto	0	5	0	

Bar and Compound Magnets	from 15s. 0d. to	2	2	0
Tape measures, from one pole to six poles in length, divided for land surveying, or the measurement of timber, in leather boxes, &c.	6s. to	0	15	0
Brass Speaking Trumpets	from 5s. 6d. to	0	18	0
Storm Glasses, or Prognosticators	from 6s. 6d. to	0	14	6
Steel Joint Dividers, 4, 5, 6, 7, and 8 inch	per dozen, 12s. 0d. to	1	10	0
" with Shifting Leg	£1 10s. 0d. to	5	0	0
Brass Joint Dividers, 4, 5, 6, 7, and 8 inch	per dozen 9s. to	0	18	0
" with Shifting Leg	18s. 0d. to	1	16	0

	£	s.	d.
Compasses with Pen and Pencil Points, and box scale, in case...	0	4	6
" with Steel Joints ...	0	6	6
Set of Instruments, with Scale, in fish-skin case ...	0	8	6
" with Steel Joints ...	0	10	6
" and Bow Pen ...	0	12	6
" Steel Joint Instruments, with Bow Pen, Ivory Scale, Sector, and Brass Protractor ...	1	2	6
" Turned Check Instruments, and Ivory Protractor ...	1	15	0
" Round Shank ditto, with Lengthening Bar ...	2	2	0
Ebony Parallel Rules, 6, 9, 12, 15, 18, 21, and 24 inch ... from 1s. to	0	4	0
Two-foot Box Gunter's Scales ...	0	2	0
" improved by Don ...	0	5	0
" Sliding Gunter's Scale ...	0	7	6
10, 12, 15, 18, and 21 inch Globes, in black frames ... from £2 12s. 6d. to	10	10	0
" in high mahogany frames ... from £4 4s. 0d. to	21	10	0

Captain Smallman Tovey's Azimuth Dial.

This Instrument for determining the error of the Compass (variation and deviation combined) at sea, is a modification of what is called the Dumb Card; it is used in connexion with Godfray's Time Azimuth Chart, and the two will be found very useful auxiliaries to all who are in command of iron ships and steamers. Price, with tipped stand £5 10s. 0d.

ADJUSTMENT OF IRON SCREW COMPASSES.

This branch of the business is conducted by Mr. W. H. ROBERTS, who has for some years past paid special attention to the adjustment of Compasses on board Iron Vessels; during which period he has adjusted the Compasses of many of the largest vessels in the principal Ports of the United Kingdom, a list of which may be had on application.

INCEY and SON'S NEWLY-INVENTED SPRING-COMPASS.

This Compass is particularly adapted for Iron Screw Steam-ships, or Vessels that have much vibratory motion. The invention can be applied to any Compass already in use, at a charge of £2 2s.

INCEY and SON'S IMPROVED FLOATING COMPASS.

Price Four Guineas.

PATENT SELF-ENCLOSING LOGS.

	£	s.	d.
Friend's ...	4	4	0
Walker's (Liverpool) ...	2	2	0
Walker's (Birmingham) ...	3	10	0
Massey's ...	2	10	0
" Propeller Log ...	3	3	0
Tyson's ...	5	5	0
Reynold's. (A very superior instrument, which only needs to be seen to be appreciated. The index is protected, and the flange is not liable to be caught by weeds) ...	8	10	0

PATENT SOUNDING MACHINES.

	£	s.	d.
Friend's	4	4	0
Walker's (Liverpool)	2	2	0
Walker's (Birmingham)	2	5	0
Massey's	3	10	0
Reynold's	3	0	0

LANTERNS, BELLS, FOG-HORNS, &c.

Lamps for Sailing and Steam-vessels fitted up according to the New Regulations of the Board of Admiralty. These are of various sizes and patterns, and can be had either in tin (japanned) or in copper. Those with reflecting dioptric lenses are strongly recommended, as they give light of unusual brilliancy, and are but little more expensive.

Bells and Fog-Horns are kept in stock, as the Regulations oblige vessels to carry them for use in thick weather. They are of various sizes and prices.

CHRONOMETERS.

A large number of these Instruments is kept in stock and constantly rated. Purchasers may freely inspect the Rate Book; thus they have the opportunity of making such a selection as will give them confidence in the correct performance of the instrument. If not approved after a twelvemonth's trial, the Chronometer may be exchanged for another.

CHRONOMETERS re-sprung, re-adjusted, rated, bought, or exchanged.

Best Chronometers, going two days	... from	£30	0	0
" " " eight days	... from	35	0	0
" " for the Pocket, in gold cases	... from	35	0	0

Second-hand CHRONOMETERS kept in stock, at various prices.

Chronometers lent on hire.

WATCHES.

The following is our List of Prices of Watches, which are all of superior quality, and particularly adapted for the use of seafaring persons;—

Patent Detached Lever Watch, capped and jewelled, in silver cases	... from	£5	0	0	to	£14	0	0
" " in gold cases	... from	12	0	0	to	18	0	0
" " in silver hunting cases	... from	10	0	0	to	15	0	0
" " in gold hunting cases	... from	22	0	0	to	27	0	0
" " Chronometer Balance	... from	21	0	0	to	27	0	0

Messrs. IMRAY AND SON

Beg leave to inform Owners and Shipmasters, that they are prepared

to supply every description of **INSTRUMENTS, CHART, or BOOK**

—**ENGLISH or FOREIGN**—which may be desired for Sea use or for

Ship purposes. And they will undertake that they shall be of the

best quality, which their long standing in the Trade, and their extensive

connexion, enable them to offer on the most reasonable terms.

ATLASES.

The following Atlases, published by Messrs. G. PHILIP and SON, contain all recent geographical discoveries. The maps are elegantly and clearly engraved, and the system of colouring adopted very much increases their usefulness. Being publications of considerable excellence, we recommend them with confidence:—

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THE PALINURUS.

(INVENTED BY MESSRS. REYNOLDS AND WIGGINS.)



THIS valuable Instrument determines the deviation of the Compass on *Even Keel* or at any *Angle of Heel*. Its simplicity and accuracy will, on inspection, be found a great recommendation. For Iron sailing Ships going on Southern voyages it is especially adapted, as it is well known that corrections for one Hemisphere are frequently useless in another.

By the use of this Instrument the position of the Ship's head may be found at any time the Sun is visible, in any part of the world, *without calculation*.

Price, without the Klinometer, £4 4s.; with the Klinometer, £5 5s.

THE FOLLOWING ARE ALL THE INSTRUCTIONS FOR USING THE INSTRUMENT THAT ARE REQUIRED:—

1. Set for variation by turning the Screw at the South point.
 2. Set the Latitude Pointer to Ship's latitude at time of observation.
 3. Find the apparent time at Ship (say within 5 ^{seconds}) and turn the Instrument by means of the knobs at East and West, until the shadow of the edge of the Sector cuts the time on the Hour Circle.
- The point now at "Ship's Head" is the course the ship is on (Magnetic), the difference between which and the Binnacle Compass is the deviation of that Compass on that point.
- A pair of Sights are supplied which can be fitted to either end of the Sector, for the purpose of taking bearings of the Moon and Stars, or the Sun, when not bright enough to cast a shadow.
- When using them (*having set the Latitude Pointer*), set the tail piece to the time on the Hour Circle and turn the Instrument as directed in Rule 3, until the object is observed through the sights.
- In high latitudes, and also when using the sights, it will be necessary to lift the Hour Circle, &c., out of the bowl by means of the ends projecting at East and West.
- By placing the Sector upright, the Sights may also be used for taking Magnetic bearings.

THE IMPROVED SPIRIT COMPASS.

(INVENTED BY MESSRS. REYNOLDS AND WIGGINS.)

THIS valuable instrument is a great improvement upon the Spirit Compasses hitherto in use, the card being made buoyant by means of a hollow copper globe attached to it, by which means the serious oscillation of the card, so frequently complained of, is overcome. It is almost indispensable on board Screw Vessels and Yachts, and while more particularly intended for those vessels, it is equally available for Sailing Ships, being so constructed as to be of service either in fine or stormy weather; it can also be converted into a complete Azimuth Compass.

Price £5 5s. to £8 8s.

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Price 5s.

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THE innumerable and vexatious difficulties to which Travellers, Merchants and Mariners are often exposed, from an inability to make themselves understood—not only in matters of a trivial nature, but in cases of sudden emergency—as by Consuls, Pilots, Shipping Agents, &c., when the misapplication of a word or sentence might lead to the most unfortunate results in the sacrifice of life and property, has long since proved the necessity of having some easy means of communication by which people of different nations could in a moment make themselves mutually understood. It is, then, with the view of remedying this evil that I have published, in the six languages with which I am conversant, a GENERAL DIALOGUE, embracing the most various and necessary subjects of conversation in matters of business and every-day life, besides such as are most likely to arise in *cases of wreck*, and on the *entering of vessels into a port or harbour*, &c. I am aware that other Dictionaries in several languages exist, but, to my knowledge, no one in this country has ever undertaken to publish a similar work. Induced by this motive, and invited by several practical men who acknowledge the utility of such an enterprise, and have kindly promised their support, from the conviction that it will answer the purpose for which it is intended, viz., that with its assistance the *natives of SIX NATIONS will be able to make themselves instantly and mutually understood upon the most important subjects occurring in trade*, or when *travelling*, only by *pointing to the numbers in the book*; or when *at sea*, and at a distance even of miles, by *simply employing Marryat's Signal Flags*, or *writing the numbers with chalk on a black board*,—I beg to recommend this work to the favorable reception of the public.

To make this work as perfect as possible, principally in technical matters, I have taken for guides the most pre-eminent English and Foreign authors.

It is divided into parts, each part containing *sentences and phrases most frequently used on voyages and in daily intercourse*, and as this book moreover contains the *principal incidents and manœuvres on board ships, at sea and in harbour*, the names of *all parts of the vessel, her sails and rigging*, the terms *most frequently used in Custom-houses, with Consuls, Agents, Surveyors, Pilots, &c.*, I trust its utility will be acknowledged, and that it will meet with the success it deserves.

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- PART III.—A list of different trades.
- PART IV.—Principal articles of merchandise in EIGHT LANGUAGES.
- PART V.—Evolutions and words of command on getting under weigh, sailing, making land, or entering a harbour or dock, and on steering, staying, veering, points of the compass, &c.
- PART VI.—Quarantine, sickness, death, burial, &c.
- PART VII.—Shipwreck, average, war, peace, &c.
- PART VIII.—Wind and weather, sea, tide, currents, &c., and on the sailing qualities of a ship.
- PART IX.—Denomination of all the component PARTS OF A SHIP, AND INVENTORY OF THE SAME, &c.
- PART X.—Table shewing the comparative value OF THE MOST CURRENT GOLD AND SILVER COINS, MEASURES AND WEIGHTS.

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